AN EVALUATION OF KNOWLEDGE AND CURRENT TRENDS OF OMEGA-3 (n-3) SUPPLEMENTATION IN PARENTS OF CHILDREN AT PUBLIC PRIMARY SCHOOLS IN THE CITY OF CAPE TOWN

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DECLARATION

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ABSTRACT

Background: Omega-3 fatty acids and supplementation is very topical, attracting both public and interest from the industry. Findings from various research studies led a number of authorities to encourage the general population to consume more omega-3. This is the first study of its kind to be conducted in this population.

Objective: To determine the current knowledge and trends of omega-3 (n-3) supplementation in parents of children at public primary schools in the City of Cape Town.

Design: An observational and analytical and descriptive and cross-sectional study was performed.

Methods: Purposive sampling was used to select a minimum of 150 parents from the six (6) randomly selected public primary schools. The schools were then divided into three different living standard measure (LSM) groups. The research questionnaire was made available at the Parent Teachers meetings where all parents had the option to complete the questionnaire anonymously at the meeting.

Results: Six hundred and fifty seven (n=657) parents, mostly mothers, with a mean age of 37 years, completed and returned the questionnaires. The mean monthly income (p=0.00, SD=2.63) and the education level (p=0.00, SD=1.37) differed significantly between each of the three LSM groups. Prior to the study, 80.1% of parents (n=526) had heard of omega-3 supplements and overall knowledge of omega-3 was significantly better in this group (p=0.00) when compared to the group that had not heard of omega-3 previously. The overall mean omega-3 knowledge score for the three LSM groups (n=657) was 71%. The high and low LSM groups differed significantly in terms of omega-3 knowledge (p=0.02), but not statistically significantly once adjusted for income and education level (p=0.75). The main sources of information, where all parents (n=526) indicated having heard of omega-3 supplements, was from television (n = 230, 35%), books (n= 220, 33.5%) and the health worker (n=199, 30.3%).

A total of 38.5% (n=253) of parents indicated that they gave their children omega-3 supplements. The overall omega-3 knowledge was significantly better (p=0.00) in parents who gave their children omega-3 supplements than the group that did not give supplements to their children. Income and the education level differed between all three LSM groups for those giving their children omega-3 supplements, but these

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variables did not influence the choice to give omega-3 supplements. Doctors (n=58, 22.9%) and the parents' own decision (n=60, 23.7%) to supplement were the most favoured sources of recommendation indicated overall. Most parents indicated that the omega-3 supplement they administered was from a marine source (n=105, 41.5%). Only 35.2% (n=89) of parents giving omega-3 supplements indicated they knew the dose they were administering. Most of the children (n=90) were taking 500 mg omega-3 supplements daily.

Conclusions and Recommendations: Statistically significant differences existed between the three LSM groups regarding various aspects of omega-3 knowledge and the sources from which parents had been informed and those who gave their children omega-3 supplements. Recommendations include education and public health programs supplying information to parents on omega-3 supplementation, as well as on omega-3 in the children's diets.

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OPSOMMING

Agtergrond: Omega-3 vetsure en supplementasie is ‘n baie aktuele onderwerp, wat beide die belangstelling van die publiek en industrie betrek. Bevindinge van verskeie navorsingstudies het daartoe gelei dat verskeie instansies die algemene publiek aanmoedig om meer omega-3 in te neem. Dit is die eerste studie van sy soort wat in dié populasie groep gedoen is.

Doelwit: Om die huidige kennis en tendensies/neigings in omega-3(n-3) supplementasie in ouers van kinders by publieke laerskole in die stad Kaapstad te bepaal.

Ontwerp:’n Waarnemende- en en analitiese en beskrywende- dwarsdeursnitstudie is gedoen.

Metode: Daar is gebruik gemaak van ‘n doelgerigte steekproefneming om ‘n minimum van 150 ouers uit ses (6) ewekansig geseleteerde publieke laerskole van uit te kies. Die skole is in drie verskillende lewenstandaardgroepe (LSM) verdeel. Die navorsingsvraelys is by ‘n Ouer-Onderwyservergadering beskikbaar gestel en alle ouers het ‘n geleentheid gehad om die vraelys anoniem by die vergadering te voltooi.

Resultate: Seshonderd sewe-en-vyftig (n=657) ouers, meestel moeders, met ‘n gemiddelde ouderdom van 37 jaar, het die vraelyste voltooi en teruggegee. Die gemiddelde maandlikse inkomste (p=0.00, SD=2.63) en vlak van opvoeding (p=0.00, SD=1.37) het noemensvaardig tussen elk van die drie LSM groepe verskil. Voor die studie het 80.1% van die ouers (n=526) al van omega-3 supplemente gehoor en die algehele kennis van die groep was beduidend beter (p=0.00) as die groep wat voorheen nie van omega-3 gehoor het nie. Die gemiddelde algehele omega-3 kennistelling vir die drie LSM groepe was 71%. Die hoë en lae LSM groepe het beduidend ten opsigte van omega-3 kennis (p=0.02) verskil, maar nie statisties-beduidend wanneer dit vir inkomste en opvoedingsvlak (p=0.75) aangepas is nie. Die hoofbronne van inligting waar al die ouers (n=526) wat aangedui het dat hulle van omega-3 supplementasie gehoor het, was deur televisie (n=230, 35%), boeke (n=220, 33.5%) en die gesondheidswerker (n=199, 30.3%). ‘n Totaal van 38.5% (n=253) ouers het aangedui dat hulle hul kinders omega-3 supplemente gee. Die algehele omega-3 kennis van ouers wie hulle kinders omega-3 supplemente gee was statisties beduidend beter (p=0.00) in vergelyking met die groep wat nie

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supplemente vir hulle kinders gee nie. Die inkomste en opvoedingsvlak het verskil tussen all drie LSM groepe wat hulle kinders omega-3 supplementasie gegee het, maar hierdie veranderlikes het nie die keuse om omega-3 supplemente te gee beïnvloed nie. Mediese dokters (n=58, 22.9%) en die ouer se eie besluit (n=60 23.7%) om te supplementeer, was die gunsteling bronne van aanbeveling in die algemeen. Die meeste ouers het aangedui dat die omega-3 supplement wat hulle gegee het van ‘n visbron afkomstig (n=105, 41.5%) is. Net 35.2% (n=89) van die ouers wat omega-3 supplemente gee het aangedui dat hulle die dosis kenwat hulle gee. Meeste van die kinders (n=90) het 500mg omega-3 supplemente daagliks gekry.

Gevolgtrekking en aanbevelings: Statistiese beduidende verskille is tussen die drie LSM groepe ten opsigte van verskeie aspekte van omega-3 kennis en bronne waaruit ouers ingelig is, sowel as die ouers wie hulle kinders omega-3 supplemente gegee het, gevind. Aanbevelings sluit opvoeding en publieke gesondheidsprogramme in, wat inligting aan ouers sal verskaf oor omega-3 supplementasie sowel as omega-3 in die kinders se dieëte.

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CONTRIBUTIONS BY PRINCIPAL RESEARCHER, STATISTICIAN AND SUPERVISORS

The principal researcher (Megan Kluyts) developed the idea and the study protocol, with the assistance of Dr Debbi Marais.

The principal researcher planned the study, undertook data collection, captured the data for analysis, analysed the data with the assistance of a statistician (Prof DG Nel), interpreted the data and drafted the thesis.

Dr Debbi Marais and Prof Marius Smuts (Supervisors) provided input at all stages and revised the protocol and thesis.

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TABLE OF CONTENTS

	Page
DECLARATION	ii
ABSTRACT	iii
OPSOMMING	v
ACKOWLEDGEMENTS	vii
LIST OF TABLES	xiii
LIST OF FIGURES	xiv
LIST OF APPENDICES	xv
LIST OF ABBREVIATIONS	xvi
DEFINITION OF TERMS	xviii
CHAPTER 1: LITERATURE REVIEW AND DESCRIPTION OF THE RESEARCH QUESTION	
1.1 DIETARY FATS	2
1.2 POLYUNSATURATED FATTY ACIDS (PUFA	3
1.2.1. Omega-3 and Omega-6 PUFA	3
1.2.2 Long Chain PUFA (LC-PUFA) Metabolism	4
1.2.3 Sources of Omega-3 Polyunsaturated Fatty Acids	5
1.2.4 Omega-3 PUFA Conversion	6
1.2.5 Omega-6 PUFA	7
1.2.6 Dietary Recommendations for Omega-3 PUFA	8
1.3 LIFESTAGE	11
1.3.1 Pregnancy, Lactation and Infancy	11
1.3.2 Childhood	12
1.4 HEALTH AND DISEASE	14
1.4.1 Allergies	14
1.4.2 Attention Deficit/Hyperactivity Disorder	15
1.4.3 Behaviour	15

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1.4.4 Blood Pressure 16
1.4.5 Cholesterol and Cardiovascular Disease 16
1.4.6 Cancer 17
1.4.7 Diabetes 18
1.4.8 Immunity 18

1.5 OMEGA-3 SUPPLEMENTATION IN CHILDREN 20

1.6 STATEMENT OF THE PROBLEM 21

1.7 MOTIVATION FOR THIS STUDY 21

CHAPTER 2: METHODOLOGY
2.1 STUDY AIM AND RESEARCH OBJECTIVES 23
2.1.1 Study Aim 23
2.1.2 Research Objectives 23

2.2 STUDY DESIGN 23

2.3 STUDY POPULATION 23
2.3.1 Sample Selection 24
2.3.2 Inclusion Criteria 25

2.4 METHODS OF DATA COLLECTION 25
2.4.1 Questionnaire Design and Validation 26
2.4.2 Measuring Instruments 27
2.4.3 Data Collection 28

2.5 DATA ANALYSIS 29

2.6 ETHICS AND LEGAL ASPECTS 30

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CHAPTER 3: RESULTS

3.1 VALIDITY OF THE QUESTIONNAIRE 33
3.1.1 Content Validity 33
3.1.2 Face Validity 34

3.2 DEMOGRAPHICS OF PARTICIPANTS 35
3.2.1 Relationship 35
3.2.2 Age 35
3.2.3 Income 36
3.2.4 Education Level 37
3.2.5 Children's Grade 38

3.3. OMEGA-3 KNOWLEDGE 39
3.3.1 Evaluation of Omega-3 Knowledge Score per Question 40
3.3.2 Factors influencing Omega-3 Knowledge Score 45
3.3.2.1 Relationship and omega-3 knowledge score 45
3.3.2.2 Age and omega-3 knowledge score 45
3.3.2.3 Income and omega-3 knowledge score 45
3.3.2.4 Education level and omega-3 knowledge score 46
3.3.2.5 Income and education level and omega-3 knowledge score 46

3.4. OMEGA-3 TRENDS 46
3.4.1 Heard of Omega-3 Supplements 46
3.4.2 Take Omega-3 Supplements 49
3.4.3 Factors Influencing Taking of Omega-3 Supplements 52
3.4.3.1 Income and taking omega-3 supplements 52
3.4.3.2 Education level and taking omega-3 supplements 53
3.4.3.3 Income and education level and taking omega-3 supplements 53
3.4.3.4 Taking omega-3 supplements and omega-3 knowledge score 53
3.4.4 Source of Omega-3 in Omega-3 Supplement 54
3.4.5 Omega-3 Supplement Dosage 56

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CHAPTER 4: DISCUSSION

4.1 INITIAL OBSERVATIONS 61

4.2 OUTCOMES 61

4.2.1 Demographics of Participants 61
4.2.2 Knowledge Score of Omega-3 61
4.2.3 Trends in Omega-3 Supplementation 65

4.3 LIMITATIONS OF THE STUDY 67

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSION 69

5.2 RECOMMENDATIONS 71

REFERENCES 73

APPENDICES 82

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LIST OF TABLES

Chapter 1

Table 1.1 Recommendations for Total Dietary Fat Intake

Table 1.2 Recommendations for Omega-6 Intake

Table 1.3 Recommended Dietary intakes for Total Fat and FA

Table 1.4 Recommended Dietary Intakes for Total Fat and FA Intake: children (2-18 years)

Chapter 3

Table 3.1 Total Respondents from invited groups of Expert Panel

Table 3.2 Distribution of Parents in the three LSM groups

Table 3.3 Average Knowledge Score of Omega-3 for all Parents by Question (n=657)

Table 3.4 Knowledge Score of Omega-3 per Question and LSM grouping (n=657)

Table 3.5: Possible Sources of recommendation of Omega-3 supplements to all Parents (n=253)

Table 3.6 Omega-3 supplement dosage taken by Child One, Child Two and Child Three for each LSM group

Chapter 5

Table 5.1 Nutritional Content and Pricing of two tins of Pilchards in retail stores in South Africa

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LIST OF FIGURES

Chapter 1

Figure 1.1 General Classification of Polyunsaturated Fatty Acids

Figure 1.2 Metabolism of Omega-3 and Omega-6 Fatty Acids

Chapter 3

Figure 3.1 The plot of means and confidence intervals for Total Monthly Income between the three LSM groups (p=0.00)

Figure 3.2 The plot of means and confidence intervals for Level of Education between the three LSM groups (p=0.00)

Figure 3.3 Distribution of Children per Grade in an LSM grouping

Figure 3.4 The plot of means and confidence intervals for Parent's knowledge of Omega-3 per LSM group (p=0.04)

Figure 3.5 Sources of Information from which the parents in all LSM groups heard of Omega-3 supplements (n=526)

Figure 3.6 The plot of means and confidence intervals for Parents that heard of Omega-3 supplements and their knowledge of Omega-3 (n=526)

Figure 3.7 Sources of recommendation of Omega-3 supplements to all Parents (n=253)

Figure 3.8 Sources of recommendation of Omega-3 supplements to Parents per LSM group (n=253)

Figure 3.9 The plot of means and confidence intervals of Parents Omega-3 knowledge and gave Omega-3 supplements to their children (n=253)

Figure 3.10 Source of Omega-3 supplement taken by all groups (n=253)

Figure 3.11 Sources of Omega-3 supplement taken per LSM group (n=253)

Figure 3.12 Sources of Recommendation for the Dose of Omega-3 Supplement for all 3 LSM groups (n=253)

Figure 3.13 Sources of Recommendation for the Dose of Omega-3 Supplement per LSM group (n=253)

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LIST OF APPENDICES

Appendix 1	Random selection of Public Primary schools included in the Research Study
Appendix 2	Letter of invitation to the Delphi group of Experts
Appendix 3	Panel of Delphi Experts
Appendix 4	Delphi Questionnaire
Appendix 5	Research Questionnaire
Appendix 6	Navorsingsvraelys
Appendix 7	Letter accepting translation of Questionnaire into Afrikaans
Appendix 8	Letter to the Western Cape Education Department (WCED) requesting permission to contact Primary Schools in the City of Cape Town (CoCT) for purposes of the Research study
Appendix 9	Letter from the Western Cape Education Department (WCED) granting permission for purposes of the Research study
Appendix 10	Letter to Primary Schools requesting participation in the Research study
Appendix 11	Presentation: '*The value of Omega-3 in my child's diet*'

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LIST OF ABBREVIATIONS

%E	Percent of Energy
AA	Arachidonic acid (C20:4n-6)
ADA	American Dietetic Association
AHA	The American Heart Association
AI	Adequate Intake
ALA	Alpha-linolenic acid (C18:3n-3)
AMDR	Acceptable macronutrient distribution range
AMPS	All Media and Products Survey
ARA	Arachidonic acid (C20:4n-6)
C	Care-givers
CoCT	City of Cape Town
CVD	Cardiovascular disease
DC	Dietitians of Canada
DHA	Docosahexaenoic Acid (C22:6n-3)
DS	Dietary supplement
EFA	Essential Fatty Acid(s)
F	Fathers
F&P	Fish and Plant
FA	Fatty acid
EPA	Eicosapentaenoic Acid (C20:5n-3)
G	Grandparents
H/WORK	Health Worker (includes doctor, nurse, dietitian, pharmacist)
ISSFAL	International Society for the Study of Fatty Acids and Lipids
LA	Linoleic acid (C18:2n-6)
LC-PUFA	Long-chain Polyunsaturated Fatty Acids
LDL	Low density Lipoprotein
LSM	Living Standard Measure
M	Mothers
MUFA	Monounsaturated fatty acid
N	Number, referring to sample size
Omega-3 (n-3)	Omega-3 Polyunsaturated Fatty Acids or Omega-3

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Omega-6 (n-6)	Omega-6 Polyunsaturated Fatty Acids or Omega-6
NSAID	Nonsteroidal anti-inflammatory drugs
Q	Question
PUFA	Polyunsaturated Fatty Acid (2 or more double bonds)
RDA	Recommended Dietary Allowance
RCT	Randomized Control Trials
SAARF	South African Advertising Research Foundation
SFA	Saturated Fatty Acids
SD	Standard Deviation
SU	Stellenbosch University
TFA	Trans Fatty Acids
U-AMDR	Upper value of acceptable macronutrient distribution range
UL	Tolerable upper intake level
WCED	Western Cape Education Department

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DEFINITION OF TERMS

Parents — A natural or adoptive parent, managing or possessory conservator, or court appointed legal guardian of a person.

LSM — The South African Advertising Research Foundation (SAARF) living standards measure (LSM) is the most widely used segmentation tool in South Africa. It divides the population into 10 LSM groups, 1 (lowest) to 10 (highest).

The SAARF LSM is a unique means of segmenting the South African market. It cuts across race and other outmoded techniques of categorising people, and instead groups people according to their living standard using wealth and access indicators such as degree of urbanisation, ownership of cars and major appliances and access to basic services such as water and electricity. Because it is a multivariate segmentation tool constructed from 29 individual variables, it is a stronger differentiator than any single demographic. (http://www.saarf.co.za/saarf/allabout.htm).

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CHAPTER 1: LITERATURE REVIEW AND DESCRIPTION OF THE RESEARCH QUESTION

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1.1 DIETARY FATS

Triglycerides (fats and oils), phospholipids and sterols (cholesterol) are all defined as dietary fats. These dietary fats originate from either animals or plants. The fatty acids (FA) found in various lipid molecules are the major integral part of dietary fats. In the body they can be incorporated into blood lipids as structural lipids in biological membranes and in fat deposits. The classification of fatty acids depends on their degree of saturation. This includes saturated fatty acids (SFA) from mainly animal origin, as well as unsaturated fatty acids, namely monounsaturated (MUFA) from both plant and animal origin, and polyunsaturated (PUFA) fatty acids mainly from plants. Polyunsaturated fats can then further be classified into either omega-3 (n-3) or omega-6 (n-6) FAs.[1]

Dietary fat not only provides the body with a fuel source, it is also a dense source of energy, protects it from mechanical shock and helps keep it warm. In food, dietary fat aids the absorption of the fat-soluble vitamins A, D, E and K and many other compounds as well as give foods additional taste, flavour and tenderness.[1,2]

The American Dietetic Association (ADA) and the Dietitians of Canada,[3] both recommend a total daily amount of dietary fat according to age and as a percentage of the total daily energy intake (Table 1.1), which emphasizes a reduced intake of SFA and trans fatty acids (TFA) together with an increased intake of omega-3.[3]

Table 1.1: Recommendations for Total Dietary Fat Intake[3]

Age Group	**Total Dietary Fat Intake[a]**
1-3 years	30-40%
4-18 years	25-35%
Adults over 18 years	20-35%

[a] As a percent of Energy (%E) Intake

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1.2 POLYUNSATURATED FATTY ACIDS (PUFA)

1.2.1. Omega-3 and Omega-6 PUFA

The most important families of FA in human nutrition are the omega-6 and omega-3 families of PUFA. The human body can manufacture all fats excepting two FAs - the PUFAs, namely linoleic (LA) and alpha-linolenic (ALA) acids, called essential fatty acids.[4] These two FAs are precursors of the eicosanoids (hormone-like substances) which may help with blood pressure regulation, pulse rate, blood coagulation, blood lipids and the immunological response. They are also essential in the development and growth of infants. Docosahexaenoic acid (DHA) is a derivative of ALA and has a major role to play in both the functioning of the retina of the eye and in brain development.[1,5]

Figure 1.1 shows the general classification of PUFA and of food sources that provide PUFA in the human diet. LA is the parent FA of omega-6 and its longer chain metabolites include arachidonic acid (AA), although it is not an essential FA despite its cardinal function role in upholding “metabolic integrity”. Whilst, the omega-3 FA ALA has two longer chain metabolites, namely, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).[6]

The acceptable range for total PUFA omega-3 and omega-6 can range anything between 6-11% of energy intake (%E). Thus, the acceptable macronutrient distribution range (ADMR) for PUFA is 6–11%E. While, the adequate intake (AI) to help prevent deficiency is between 2.5-3.5%E.[4]

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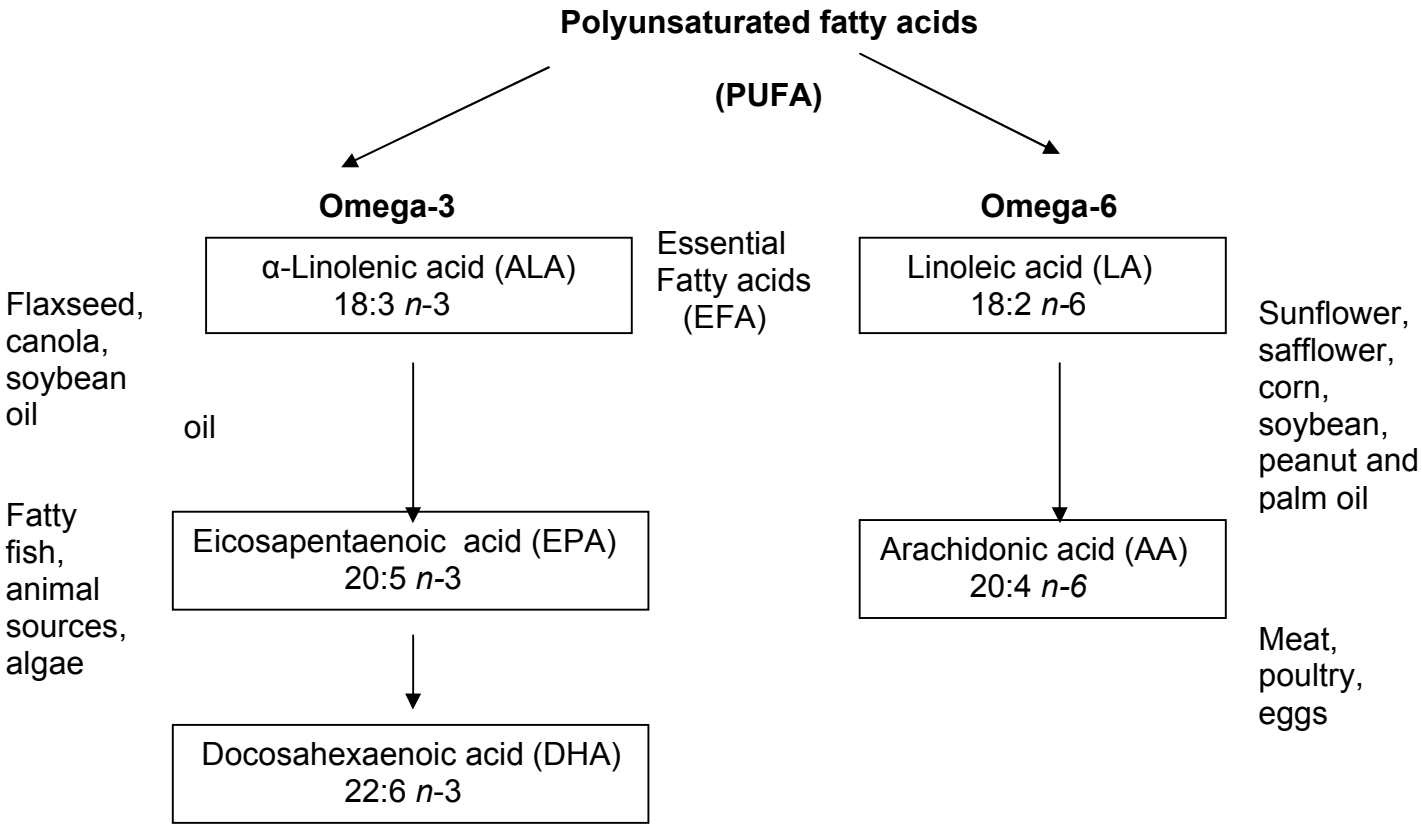

Figure 1.1: General Classification of Polyunsaturated Fatty Acids[6]

Over the last 100 years, it has been suggested that even though total fat and omega-6 intake has been increasing up until around 1980, at the same time our intake of omega-3 has actually decreased. As the metabolic pathways of these two families of PUFAs share some of the same enzymes, it is considered that the consumption of these increased amounts of omega-6 may adversely affect the metabolism of omega-3.[7]

1.2.2 Long chain PUFA (LC-PUFA) Metabolism

The human body can convert LA and ALA from the diet to the omega-6 and omega-3 families of C20 and C22 LC-PUFA by a series of alternating elongation and desaturation enzyme reactions (Figure1.2).[4,8,9,13]

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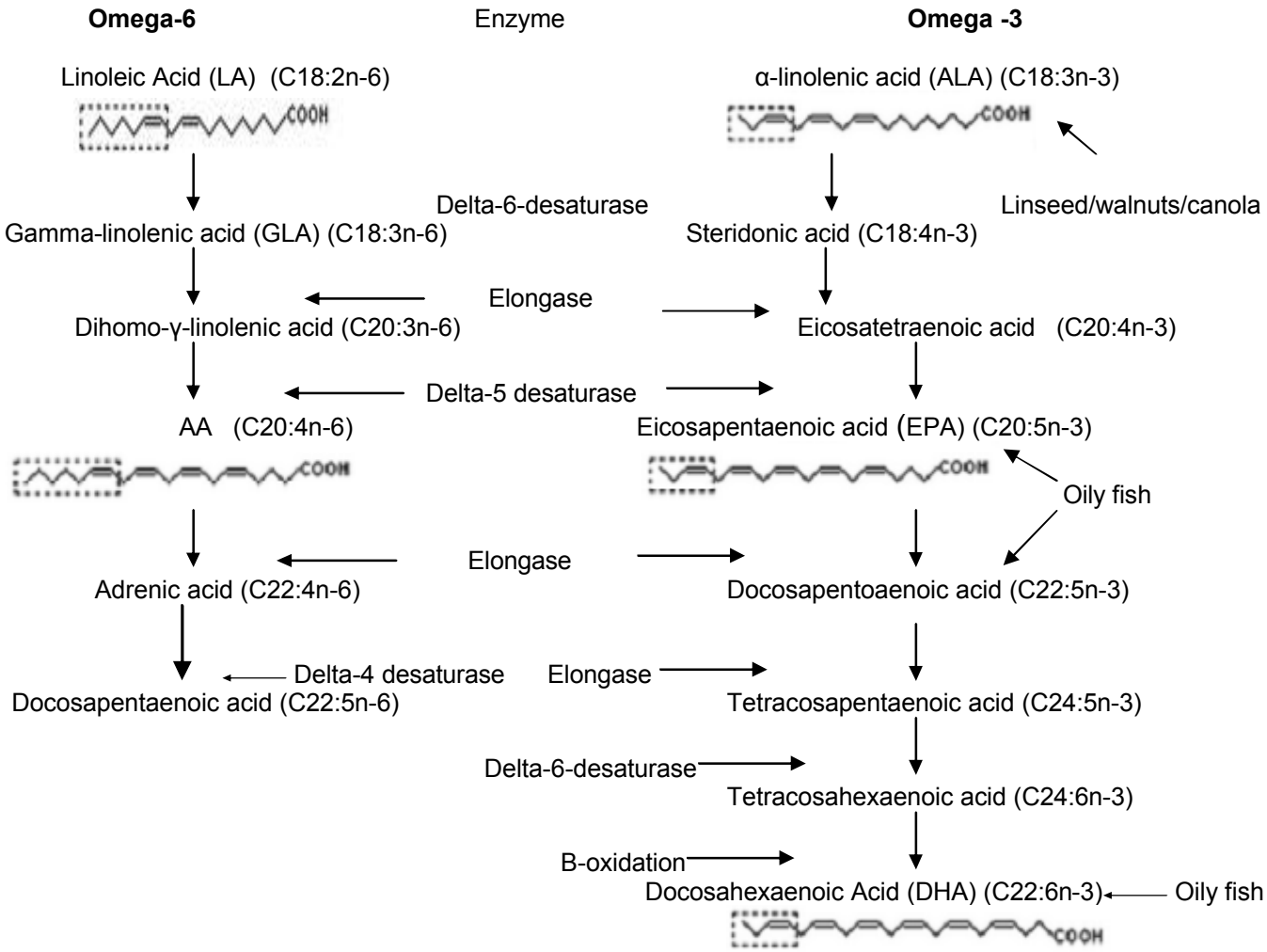

Figure 1.2: Metabolism of Omega-3 and Omega-6 Fatty Acids[4,8,9,13]

The two metabolic pathways of omega-3 and omega-6 act independently of each other and have no crossover reactions. However, there is competition between these two series for their conversions, since both pathways use the same enzymes. In human diets LA is the main PUFA and intakes of ALA are generally low, which in turn leads to both cell and plasma levels of omega-6 derived from LA tending to be higher than the omega-3 levels.[4]

1.2.3 Sources of Omega-3 Polyunsaturated Fatty Acids

Plant fats and oils, like flaxseed or linseed, canola and soy oils, nuts like walnuts and tub margarines contain ALA, which is a metabolic precursor of the omega-3 FA

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found in fatty fish and fish oils (Figure 1.1).[6,7,10,11] Even though linseed oil is a rich source of omega-3, it is not commonly consumed in South Africa.[1]

For the public at large, omega-3 benefits health.[12] Overall, some beneficial biological activity has been assigned to plant-derived omega-3. However, most of the associated health benefits are likely independent of the conversion of ALA to the FA found in fatty fish. Dietary oils that are rich in ALA do not, for the most part, reproduce the same overall biological activity associated with that of dietary fish oils.[13]

DHA and EPA are only found in animal products and marine algae, with fatty fish, fish oils, eggs and marine algae being good sources.[6,14,29] The flesh of fatty fish is a better source of FA than that of white fish. Fatty fish includes salmon, sardines, snoek, pilchards, mackerel, herring and trout, whether canned, fresh or frozen. Fresh tuna is also considered to be a fatty fish, however, during the canning process the fat content of the tuna is substantially reduced thereby excluding canned tuna from the fatty fish group. Examples of white fish include cod, haddock, hake and sole.[6,15,16,29]

Cow's milk is low in both ALA and LA and contains no DHA or EPA.[6,29] Breast milk, on the other hand, contains LA, ALA, DHA and EPA although the quantity is dependent on the mother's diet and her fat stores.[17,18]

Populations from developing countries are possibly even more at risk of an inadequate EFA intake due to a combination of low intakes of energy, total fat and animal foods. Micronutrients such as vitamin B6, vitamin E, zinc and iron are needed for the conversion through their role in elongation enzymes of ALA and LA to EPA + DHA and AA.[19] It is therefore possible to deduce that micronutrient-deficient populations may have an even lower conversion rate than healthy populations and this can result in a lower status of both EPA + DHA and AA.[6,19]

1.2.4 Omega-3 PUFA Conversion

People who consume a typical western diet tend to have a low rate of converting ALA to EPA and DHA; however, this may also differ depending on common genetic

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variations in the FA desaturase (FADS) gene cluster enabling certain individuals to form more EPA, DHA and AA from ALA and LA than others. Conversion to EPA is approximately 8% and conversion to DHA is less than 0.1% in men. While, in women, fractional conversion to DHA appears to be greater (9%) as a result of the actions of oestrogen on the delta-6-desaturase enzyme, this may partly due to a lower rate of utilisation of ALA for ß-oxidation in women and the up-regulation of the conversion of EPA to DHA.[20-23] It is suggested that the most effective way to increase a particular omega-3 FA is to provide that specific PUFA in the diet due to the body's limitations in the inter-conversion of omega-3.[24]

Infants have an even lower rate of conversion than adults and there is increasing evidence that precursors, like ALA, are not adequately converted to DHA to allow for biochemical and functional normality in early life.[2,6] In certain circumstances, such as when infants are born prematurely, DHA can be considered a conditionally essential FA. [25]

Quantifiable changes occur in cellular membrane content in all tissues of the body within days of increasing the daily consumption of omega-3, regardless if the omega-3 source is from fatty fish, fish-oil supplements or from food products enriched with the appropriate omega-3 FA.[26,27] Cellular membranes specifically that of the retina, brain, and the myocardium become enriched in these FA.[13]

1.2.5 Omega-6 PUFA

Omega-6 FA are the main PUFAs found in Western diets.[28] The recommended range for omega-6 in the diet varies (Table 1.2), however, the recommendations for lowering omega-6 intake is due to the possibility of high intakes antagonizing omega-3 metabolism due to the excess production of pro-inflammatory omega-6 eicosanoids. This in turn may contribute to an increased risk of inflammatory, immune and other disorders, which then may increase both plasma and tissue lipids to oxidative modification.[3]

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Table 1.2: Recommendations for Omega-6 Intake [3]

International Groups and Organizations	Omega-6 Fatty Acid recommendations[b]
United States	5-10 %
European Commission	4-8%
Food and Agriculture Organization of the United Nations / World Health Organization	5-8%
The Japan Society for Lipid Nutrition	3-4%
International Society for the Study of FA and Lipids	2-3%

1.2.6 Dietary Recommendations for Omega-3 PUFA

If the RDA is unavailable then the AI may be used as the reference for an individual's intake.[29] Table 1.3 shows the AI at different life-stages for both ALA and LA from three reputable groups and organizations.[4,6,29-31]

Most international groups and organizations recommend two servings of preferably fatty fish per week, on average providing 450-500 mg EPA and DHA per day.[3]

The Australian Nutrient Reference Values (NRV) recommends at least 190 mg/day EPA and DHA for the general population. The United States National Institute of Health however, recommends 300 mg/day EPA and DHA.[8]

The United States (US) Food and Drug Administration (FDA) cautions against an average daily intake of more than 3000mg of omega-3 from fish due to possible detrimental effects associated with a very high intake. These adverse effects can include lack of blood glucose control, increased bleeding tendencies and an increase in low density lipoprotein level (LDL) cholesterol. Further research is required to determine if these concerns are however warranted; as currently it has not been determined if higher doses would provide any additional health benefit.[8]

Interest in the potential health benefits of fish oil has emerged since the 1950s. Findings from these studies led a number of authorities to encourage the general population to consume more omega-3. Subsequently the food industry has put a number of food products on the market such as eggs, milk, cheese, and spreads

[b] As a percent of Energy Intake

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fortified with omega-3.[32,33,35] And simultaneously an extensive variety of omega-3 supplements have become available to the consumer on the South African market.[34]

Table 1.3: Recommended Dietary intakes for Total Fat and Fatty Acids[6]

Life Stages	Total fat	ALA[3] (AI)[4]	LA[5] (AI)	ALA mg/day (AI)	LA g/day (AI)	Ratio of LA to ALA	DHA[6] mg/day	DHA + EPA[7] (AI) mg/day
Institute of Medicine 2005 [31]								
0-6 months				500	4.4	5–15:1		
7-12 months				500	4.6			
1-3 years	30-40%	0.6%-1.2%E[8]	5%-10%E	700	7			
4-18 years	25-35%	0.6%-1.2%E	5%-10%E	900	10			
Pregnancy				1400	13			
Lactation				1300	13			
Adults	20-35%	0.6%-1.2%E	5%-10%E	Varies by age	Varies by age			
Food and Agriculture Organization of the United Nations (FAO) (2010) [4]								
0-6 months	40-60%E	AI 0.2-0.3%E[9]*	Breast milk composition as %E of total fat				AI: 0.1-0.18 %E*	
6-24 months	35%E	AI 0.4-0.6%E	AI 3.0-4.5%E				AI: 10-12 mg/kg	
2-4 years	25-35%E	AI ≥ 0.5%E*	AI 2-3 %E**					100-150
4-6 years		AI ≥ 0.5%E*	AI 2-3 %E**					150-200
6-10 years		AI ≥ 0.5%E*	AI 2-3 %E**					200-250
Pregnancy/ lactation	20-35%E	≥0.5%E	2-3%E				200	300
European consensus group [31]								
Pregnancy							200	

[3] Alpha-linolenic acid
[4] Adequate Intake
[5] Linoleic acid (C18:2n-6)
[6] Docohexaenoic acid (C22:6n-3)
[7] Eicosapentaenoic acid (C20:5n-3)
[8] As a percent of Energy Intake
* Children 6–24 months of age, estimation of requirements based on breast milk meeting half the daily energy needs, the rest to from non-breast milk diet

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1.3 LIFESTAGE

1.3.1 Pregnancy, Lactation and Infancy

Recommendations suggest that pregnant women should consume two fatty fish meals per week, especially during the third trimester, and lactation. The benefits on child growth outweigh the potential disadvantages that may come from increased exposure to contaminants.[35,40] Two servings of approximately 240g of cooked fatty fish per week provides approximately 450-500 mg/day of EPA and DHA.[3] The European Commission recommendations supported consensus recommendations advise both pregnant and lactating women to include a minimum daily supply of 200 mg of DHA.[38]

DHA and AA are the two main omega-3 and omega-6 PUFAs, respectively found in the brain. First ARA and later DHA accumulates rapidly during the third trimester of pregnancy and after birth with continued growth for the next several years of life. DHA is also a critical component of cell membranes, particularly in the brain required for foetal brain growth. During this time many developmental milestones are reached in terms of visual ability and acuity, cognitive and motor development.[2,6,35,36]

Certain nutrients including protein, energy, certain FA, vitamin A, folate, iron, zinc, copper, selenium, iodine and choline have greater effects on brain development than do others.[37]

Consensus recommendations and practice guidelines recommend that both the foetus and the neonate should receive LC-PUFA in sufficient quantities to support both optimal visual and cognitive development.[38] However, a review of human studies shows that there is only suggestive evidence to support supplementation during pregnancy and lactation or during lactation only for mental development and long term cognition.[39] On the other hand, studies have shown consistent benefit on visual development when supplementing with LC-PUFAS in the first year of life.[35,39] Although there is not sufficient information to make quantitative recommendations, there is some evidence to suggest 100mg DHA and 200mg AA per day.[38,39]

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Breastfeeding is the preferred method of feeding healthy full term infants as human milk supplies a source of preformed LC-PUFA. When breastfeeding is however not possible, it is suggested that infant formula provides DHA at levels between 0.2%-0.5% of fatty acids, and with the minimum amount of AA equivalent to the content of DHA.[35, 38]

FA intake and status in infants and children from developing countries varied across the spectrum when compared with the FA status of infants and children from developed countries. In particular, with regards to, omega-3 and DHA status, which was found to be lower, similar or even higher, when children relied on breast milk.[6,40]

However, randomized control trials (RCTs) have found little evidence of a beneficial effect of EPA and DHA supplementation on growth and cognitive function in healthy older children from developed countries. Similar results were seen in developing countries showing that there was no evidence of improvement in growth following omega-3 supplementation with lower dosages of approximately 100 mg EPA + DHA in children of two years or older.[6]

The intake of omega-3 rich oils during pregnancy has also been shown to reduce the risk of early preterm delivery.[38]

1.3.2 Childhood

In developing countries, it has been shown that when young children increasingly start eating other foods, and simultaneously reduce their breast milk intake, their diets as a consequence become too low in fat and omega-3. Fat intakes of below 25 %E have furthermore been associated with low vitamin intake levels in some young children.[2]

According to the FAO Report (2010)[4] the only evidence of sufficient strength to be “convincing” or “probable” which would allow a dietary recommendation to be formulated. There is sufficient probable evidence to set the value of SFA intake at <8%E and the PUFA (omega-6 plus omega-3 intake) at 11%E (Table 1.4). Similarly,

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as in the case of adults, there is convincing evidence to limit (UL) TFA intake to <1%E. There is probable evidence to recommend an AI range of EPA + DHA intake targeted at preventing chronic disease, which has been adjusted for age (Table1.4).[4]

Table 1.4: Recommended Dietary Intakes for Total Fat and Fatty acid Intake: children (2-18 years)[4]

Fat/Fatty Acids	Age Group (years)	Measure	Numeric Amount	Level of Evidence
Total fat	2-18	AMDR[j]	25-35%E[jk]	Probable
SFA[l]	2-18	U-AMDR[m]	8%E Children from families with evidence of familiar dyslipidemia (high LDL cholesterol) should receive lower SFA but not reduced total fat intake	Probable
MUFA[n]	2-18	AMDR	Total fat [%E] – SFA [%E] – PUFA [%E] – TFA [%E]	Probable
Total PUFA[o]	2-18	U-AMDR	11%E	Probable
EPA[p]+DHA[q]	2-4	AI	100-150 mg (age adjusted for chronic disease prevention)[r]	Probable
	4-6	AI	150-200 mg (bridged from an infant value of 10 mg/kg)	Probable
	6-10	AI	200-250 mg (to the adult value assigned at age 10 years)	Probable
TFA[s]	2-18	UL	<1%E	Convincing

The currently available evidence, for children aged 2-18 years, does not permit to define an age specific quantifiable estimate of an AI for EPA and DHA. However, the recommendation is that dietary advice for children should be in accordance with the adult population recommendation of 1-2 fatty fish meals per week or approximately 250mg of EPA plus DHA per day.[2]

[j] Acceptable macronutrient distribution range
[k] As a percent of Energy Intake
[l] Saturated Fatty Acids
[m] Upper value of acceptable macronutrient distribution range
[n] Monounsaturated Fatty Acids
[o] Polyunsaturated Fatty Acid (2 or more double bonds)
[p] Eicosapentaenoic Acid (C20:5n-3)
[q] Docosahexaenoic Acid (C22:6n-3)
[r] Although there is no specific data from long term studies on the relationship between fatty acid intake and chronic disease prevention from children the assumption is that children also benefit from lower saturated fat and higher PUFA intakes
[s] Total TFA from ruminant and industrially-produced sources

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1.4 HEALTH AND DISEASE

The use of PUFA supplementation has recently received a large implementation worldwide in fields such as cardiology (cardiovascular disease), clinical immunology (allergy), neurology (epilepsy), psychiatry (psychosis, severe depression), rheumatology (osteoarthritis, psoriasis), gastroenterology (inflammatory bowel diseases) and nephrology (autoimmune nephropathies).[41]

1.4.1 Allergies

Omega-3 supplementation during pregnancy has been shown to help alter immune defenses in infants and subsequently may help reduce the incidence of allergy.[42] High levels of dietary omega-3 have been found to be associated with a decreased risk of both allergic hypersensitivity and allergic rhinitis.[43] Conversely, Anandan *et al.* (2009) and Schachter *et al.* (2004) both found that omega-3 supplementation only did not improve asthma symptoms.[44,45]

At present there is conflicting evidence regarding the use of omega-3 and omega-6 supplementation, either used separately or together in combination, for the prevention and treatment of allergic diseases.[46]

Hageman *et al.* (2011) concluded that the variation in the results between omega-3 and allergy is due to the great variability across study designs, resulting in inconsistent outcomes. Most of the recent studies reviewed found beneficial effects of omega-3 on respiratory outcomes, including reductions in asthma and other allergy markers.[47]

A systematic review and meta-analysis done by Anandan *et al.* (2010) concluded that supplementation with omega-3 and omega-6 is unlikely to play a strategic role in the primary prevention of sensitization or allergic disease.[46]

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1.4.2 Attention Deficit/Hyperactivity Disorder

Converging evidence indicates that a deficient or imbalance in FA may also contribute to a range of both adult neurological and psychiatric disorders and to several common and overlapping childhood neurodevelopmental disorders. These disorders include attention-deficit/hyperactivity disorder (ADHD), dyslexia (specific reading difficulties), dyspraxia (developmental coordination disorder), and autistic spectrum disorders.[48]

It is estimated that between 3-7% of children suffer from Attention deficit hyperactivity disorder (ADHD). A neurological condition that affects more boys than girls and is characterized by the inability to concentrate for a prolonged time or pay attention to tasks, and to control impulsive actions.[49,50]

Although clinical trials demonstrate inconsistent findings and benefit of omega-3 supplementation in children with ADHD, these findings may partly be due to the varying designs of the studies that have been done.[51]

1.4.3 Behaviour

Epidemiological, biochemical and intervention studies suggest that low omega-3 intakes from the diet may have an adverse effect on both children's behavioural and cognitive development.[52-54]

FA supplementation showed improvement in both cognition and growth in infants from developing countries. These benefits were more distinct in both undernourished children and apparently healthy children from a lower socioeconomic status.[6]

A study done by Richardson *et al*. (2012) showed that supplementation with 600mg of DHA per day for a period of 16 weeks, appears to offer a safe and effective way to improve reading, working memory and behaviour in healthy children from mainstream schools who were underperforming. This study

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provided the first evidence that dietary supplementation with DHA may improve both learning and behaviour in healthy children from the general school population.[54]

1.4.4 Blood Pressure

Blood pressure tends to track from childhood into adult life. Therefore, dietary fortification of infant formula with DHA and AA has been associated with lower blood pressure at the age of six years. Early exposure to dietary LC-PUFA might have long-term beneficial results on reduced blood pressure and lowering heart disease risk.[38] Another study by Damsgaard *et al.* (2006) showed that 5mL of fish oil mixed in milk-formulation for one year was significantly associated with lower systolic blood pressure levels in children taking them compared with the control children.[55,56]

Omega-3 intake is shown to be inversely related to blood pressure, albeit with small estimated effect size. Dietary omega-3 may contribute to both the prevention as well as the control of adverse blood pressure levels.[38]

Borghi and Cicero (2006) indicate that preliminary data also suggests that an adequate omega-3 dietary intake or supplementation could be considered a cost effective way to help prevent blood pressure increase in normotensive subjects, contributing to their cardiovascular protective role.[56]

1.4.5 Cholesterol and Cardiovascular Disease

Inadequate levels of omega-3 in the modern diets of developed countries are a recognizable risk factor for both cardiovascular disease (CVD) and inflammatory diseases.[48]

There is convincing evidence that replacing SFA with PUFA decreases the risk of CVD. It is therefore recommended that SFA should be replaced with both omega-3 and omega-6 in the diet and the total intake of SFA should not

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be more than 10%E.[4] A systematic review was done by Ramsden *et al*. (2010) and showed CVD risk was reduced when TFA and SFA were substituted with a combination of mixed omega-3/omega-6 in the diet. However, substitution of only omega-6 specific PUFA interventions tended to show an increased CVD risk.[57]

Most nutritional guidelines now include recommendations for increased intakes of both EPA and DHA as a means of protecting against CVD and maintaining optimal cardiovascular health. Despite this position the consumption of fatty fish, the most concentrated dietary source of these FA, stays low in most westernised diets.[20]

The American Heart Association (AHA) and ISSFAL both recommend an intake of about 500mg per day (either as fatty fish and/or fish oil capsules) of omega-3 and approximately 15g per day (12g for women and 17g for men) for LA. Consuming adequate amounts of both these FA forms a pivotal part of the nutritional prevention and treatment of CVD.[58-60]

The AHA also recommends about 1g of EPA/DHA daily for persons with known CVD and a much higher intake of 2-4g per day, to help lower triglyceride levels.[61]

A meta-analysis by Marik and Varon (2009)[62] looked at supplementation with omega-3 and concluded that supplementation should be considered in the secondary prevention of cardiovascular events. While Kwak *et al.* (2012)[63] also did a meta-analysis where omega-3 supplementation showed insufficient evidence of a secondary preventive effect against overall cardiovascular events among persons with a history of CVD.

1.4.6 Cancer

A systematic review by Hooper *et al*. (2006) found no evidence that omega-3 had an effect on the incidence of cancer.[64]

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However, a meta-analysis done by Geelen *et al.* (2007)[65] however indicated that fish consumption and possibly omega-3 intake inhibits colorectal carcinogenesis. Studies here showed a further reduction in risk in colorectal for each additional 100g of fish consumed in a week.[65]

Diet has been found to be an important factor in the development of gastric cancer, however, a systematic review and meta-analysis done by Wu *et al*.[66] concluded that the link between fish consumption and risk of gastric cancer remained unclear.

Similarly results from a meta-analysis looking at prostate cancer incidence and omega-3, found no strong evidence of a beneficial link between fish consumption and prostate cancer, but it did however show a significant 63% reduction in prostate cancer-specific mortality.[67]

1.4.7 Diabetes

There is possible evidence of a link between PUFA consumption and the reduced risk of diabetes.[4]

A systematic review and meta-analysis by Wu *et al*. (2012)[68] on the development of diabetes mellitus showed that the overall findings did not support any major detrimental or advantageous effects of fish/seafood or EPA+DHA and also suggested that ALA may be associated with a modestly lower risk of diabetes.

1.4.8 Immunity

PUFAs are important constituents of phospholipids in all cell membranes.[69] Cells involved in the inflammatory response usually contain a relatively high proportion of the AA in their membrane phospholipids. Eicosanoids produced from AA have well-recognized roles in inflammation.[70]

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Inflammation is a normal part of the body's immediate reaction to infection or injury, but uncontrolled inflammation damages tissues. Uncontrolled inflammation plays a pivotal role in the pathology of diseases like rheumatoid arthritis, asthma and atherosclerosis.[13,71-74]

Marine omega-3's anti-inflammatory effects suggest that they may be useful as therapeutic agents in disorders with an inflammatory component and diseases characterized by active inflammation.[68,75] An increase in omega-3 cell membrane content occurs at the expense of omega-6, especially AA.[69]

EPA is a substrate for the eicosanoid synthesis and these are often less potent than those produced from AA. EPA, the potential anti-inflammatory active ingredient found in fish oil, gives rise to E-series resolvins, while DHA gives rise to D-series resolvins and protectins. Both the resolvins and protectins have an anti-inflammatory effect in the body.[46,70]

Dietary omega-3 directly affects AA metabolism not only by displacing it from membranes but also competes with AA for the enzymes that catalyze the biosynthesis of prostaglandins, thromboxanes and leukotrienes, a subclass of eicosanoids which play a role in both the immune response and inflammation. Thus, the net effect of consuming foods fortified with omega-3 is a diminished potential for cells like the monocytes, neutrophils and eosinophils to synthesize these powerful AA–derived more inflammatory mediators and a diminished ability for platelets to produce the prothrombotic agent thromboxane A_2.[13]

In a recent meta-analysis conducted by Goldberg and Katz,[76] it was found that omega-3 supplementation may improve morning stiffness, the number of affected joints, pain intensity and amount of medication that is needed to help alleviate symptoms of this disorder.[35]

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A follow-up meta-analysis done by Lee *et al* (2012) suggested that the use of omega-3 by rheumatoid arthritis patients at dosages of more than 2.7g/day for more than three months reduces NSAID consumption.[77]

1.5 OMEGA-3 SUPPLEMENTATION IN CHILDREN

It is conceivable that some infants will benefit from supplementation, whereas others will not, considering the marked variability among infants of apparent conversion of ALA to DHA and LA to ARA. Such a scenario certainly would help explain the marked variability in outcomes documented by virtually every study. It also is likely that any beneficial effects of LCPUFA supplementation will be subtle and possibly not detectable with available methodology.[78]

Omega-3 is becoming an increasingly used term amongst health professionals, in the media, as well as amongst the lay public.[8] Parents are seeking alternative treatments or a replacement for medication therapy and may supplement with essential FA.[50,79] To date, however, effective and safe omega-3 supplement doses for children have yet to be determined.[51]

Most people are hesitant to include several weekly servings of fatty fish regularly in their diets.[13] Therefore, the consumption of dietary fish-oil supplements can be seen as an effective way to increase omega-3 intake without changing dietary habits; however, compliance has been shown to be a problem because a daily intake of 1–3 fish-oil capsules is usually needed to achieve the recommended dose.[13]

On top of this, concerns exist that fish contain environmental contaminants such as heavy metals, methyl-mercury and organochlorides.[13] However, according to research done by Opperman *et al.,*[34] South African omega-3 supplements tested appear to at least be virtually free of methyl-mercury.

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1.6 STATEMENT OF THE PROBLEM

An increase in overall health and well-being of the general population may be seen with the consumption of the recommended omega-3 FA intakes.[13]

The general recommendations for the intake of omega-3 fatty acids are based on comprehensive research, however, due to entrenched dietary habits and lifestyle choices most people find it difficult to change and are hesitant to regularly include several weekly servings of fatty fish.[13]

Various brands of omega-3 supplements are being promoted in the media, which are readily available over-the-counter, from retail outlets, as well as through the internet. Advertisements also make numerous health claims for a wide range of symptoms and disorders[80] and that should be interpreted with caution.

1.7 MOTIVATION FOR THIS STUDY

Omega-3 FA and supplementation is now a contentious nutritional topic, attracting both interest from the public and the industry.

Omega-3 is a popular supplement used for children and adolescents. However, the main concern remains that the available published evidence regarding its efficacy in this population group does not always match its current popularity in the market.[51]

No research has been done to determine the knowledge of omega-3 supplementation and trends in omega-3 supplementation in parents of children in South Africa. This study aimed to determine the knowledge and current trends of omega-3 supplementation in parents of children at public primary schools in the City of Cape Town (CoCT).

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CHAPTER 2: METHODOLOGY

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2.1 STUDY AIM AND RESEARCH OBJECTIVES

2.1.1 Study Aim

The study aimed to determine the knowledge and current trends of omega-3 (n-3) supplementation in parents of children at public primary schools in the CoCT.

2.1.2 Research Objectives

(i) To assess the current knowledge of omega-3 (n-3) supplementation in parents of children at public primary schools in the CoCT.

(ii) To determine the current trends of omega-3 (n-3) supplementation in parents of children at public primary schools in the CoCT.

(iii) To compare the current knowledge of omega-3 (n-3) supplementation in parents in each of the three living standard measure (LSM) groups, of children at public primary schools in the CoCT.

(iv) To compare the current trends of omega-3 (n-3) supplementation in each of the three LSM groups, of children at public primary schools in the CoCT.

2.2 STUDY DESIGN

This study was an observational, analytical and descriptive and cross-sectional study utilizing methodologies to analyze quantitative and qualitative data.

2.3 STUDY POPULATION

The target population were parents of public primary school children in the CoCT representing all socio-economic levels of society.

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2.3.1 Sample Selection

A list of schools was sourced using the Western Cape Department of Education (WCED) website: http://wcedemis.wcape.gov.za/wced/findaschool.html. A total number of 329 primary schools, which indicated their annual fees, were identified.

The schools were divided into three different LSM groupings, using the annual school fees as a guide:

- Lower LSM grouping: <500 South African rands/year,
- Middle LSM grouping: 500-1500 South African rands/year,
- Higher LSM grouping: >1500 South African rands/year.

There were 94 schools included in the lower LSM group, paying less than R500.00 school fees per year. The middle LSM group, paying between R500.00-1500.00, included 45 schools and the higher LSM group included 88 schools, paying more than R1500.00 school fees per year.

As the target population were parents, it was decided to calculate a representative sample size using the number of women of child-bearing age (aged 18-34 years) from the Stats SA census data (http://www.capetown.gov.za/en/stats/2001census/Documents/Cape%20Town.htm), as only one parent would be allowed to partake in the study and the percentages are 48% male to 52% female for the CoCT. The CoCT had a population of 485 745 women in this age-group. To ensure that for each group any proportion that was estimated, was estimated within an 8% error, the estimated sample size per group was determined using a 95% confidence interval and was calculated as a sample size of 151. As three strata were selected, it meant that a weighted stratified sample was 50 parents in each LSM grouping.

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Two public primary schools per LSM grouping and a pilot school from the medium LSM grouping was selected using simple random sampling with the Microsoft Excel random generation number function. The simple random sampling with the Microsoft Excel random generation number function was repeated when one of the selected schools was unable to participate in the study, and the next school listed, in the specific LSM grouping, was selected and approached for inclusion into the study.

Purposive sampling was used to select a minimum of 150 persons/parents/legal guardians from the six randomly selected schools (Appendix 1).

2.3.2 Inclusion Criteria

The inclusion criteria for the parents* were as follows:

- All parents* and /or primary care-givers/legal guardian who attended the Parent/Teacher meeting at the selected Primary Public Schools in the CoCT.
- Only one parent or primary care-givers/legal guardian per family could partake.
- Only English, Afrikaans and/or Xhosa-speaking parents or primary care-givers or legal guardians could partake.
- Those parents or primary care-givers or legal guardians who consented to partaking in the study.

**Parents: A natural or adoptive parent, managing or possessory conservator, or court appointed legal guardian of a person.*

2.4 METHODS OF DATA COLLECTION

The investigator followed the following sequence of data collection:

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2.4.1 Questionnaire Design and Validation

The Delphi method was utilized for content validity of the questionnaire.

The Delphi method is an iterative process used to collect and distil the anonymous judgments of experts using a series of data collection and analysis techniques interspersed with feedback. The Delphi method is well suited as a research instrument when there is incomplete knowledge about a problem or phenomenon.[81] The contributions of individuals via this tool produce a group perspective not otherwise attainable. The Delphi method's most significant strength lies in the ability to garner opinion and seek consensus among a diverse group of participants.[82] This method works especially well when the goal is to improve our understanding of problems, opportunities, solutions or to develop forecasts.[81]

The number of phases in the Delphi process usually varies from one to six, depending on when consensus is reached. According to Stitt-Gohdes and Crews (2004), the first phase explores the subject being researched, giving participants the opportunity to contribute information they feel is appropriate. The second phase moves to determine an understanding of how the entire group views the issue. If significant disagreement is determined, the third phase is used to explore that disagreement and determine reasons for differences. The fourth phase is a final evaluation of all gathered information.[82] One quickly concludes that there is no "typical" Delphi; rather that the method is modified to suit the circumstances and research question.[81]

A letter of invitation (Appendix 2) was sent via email to 16 targeted experts with known expertise in paediatrics, fats, specifically omega-3, and /or supplementation. Following acceptance of this invitation by the experts (Appendix 3), the proposed questionnaire was sent via e-mail to seek consensus and relevancy.

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Email affords many advantages to both the researcher and Delphi participant alike. One of the most significant benefits is the expediency provided by this mode of interaction. Quick turnaround times help to keep enthusiasm alive and participation high.[81]

Each panel expert received the same pool of questions. The questionnaire comprised three sections. Section one was the socio-demographic section which included five closed questions regarding age, gender, income, and education level, number of children and ages. Section two, the knowledge section included 28 questions on omega-3 supplementation. Section three was the trends section where 12 questions were included regarding omega-3 usage and supplementation. It was then expected of each member to select 20 knowledge questions and 10 questions relating to trends. The members were requested to select their choice of questions and return to the researcher via e-mail within seven days. The final sections Two and Three of the pilot study questionnaire were compiled according to the feedback from the panel of experts.

This anonymous process was repeated in order to reach consensus.[83,34] A question was included if 75% of the experts recommended that it be included. Once suggested changes had been brought about, the questionnaire was re-sent to all experts for any further comments, in this study, the process included two rounds, thus being repeated twice, for consensus to be reached.

Face validity of the questionnaires as a research instrument was determined during a pilot study on a minimum of 10 parents at a medium LSM public primary school not selected for the study sample (Appendix 1).

2.4.2 Measuring Instruments

The questionnaire comprised three sections. Section one was the socio-demographic section which included five closed questions regarding age, gender, income, and education level, number of children and ages. Section

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two, the knowledge section initially included 28 questions on omega-3 supplementation, the questions here used descriptive statistics, including percentages, means, standard deviations**,** and standard errors, to analyze responses represented in the knowledge section. Section three was the trends section where initially 12 questions were included regarding the omega 3 usage and supplementation.

The three sections of the final questionnaire (Appendix 5 & 6) included:

- A socio-demographic section with five questions regarding age, relation to child, income, and education level, number of children and ages.
- The second section on general nutritional knowledge of omega-3 and omega-3 supplementation, with 17 knowledge questions in the form of True or False questions.
- The third section included seven questions regarding the trends relating to omega-3 usage and supplementation.

The questionnaires were anonymous as no identifying information was required. The questionnaire also included a statement that by completing the questionnaire the parents consented to taking part in the research project.

The questionnaire was made available in both English and Afrikaans, which was in accordance with the language mediums of the randomly selected schools. The Afrikaans translation was independently checked for grammar and language correctness and compared to the English version by a lecturer at Stellenbosch University (Appendix 7).

2.4.3 Data Collection

A letter was sent to the WCED requesting permission to conduct the research in the selected schools in the CoCT (Appendix 8).

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A letter of consent was granted by the WCED to conduct the study (Appendix 9) in public primary schools in the COCT.

The randomly selected schools were then contacted telephonically and a follow-up letter was sent via email to the principals of each of the selected schools, formally requesting permission to attend and collect data at their Parent Teachers (PT) meetings (Appendix 10). The request included asking for a five minute session to explain the purpose of the research and to invite parents to complete the questionnaire at the meeting.

Questionnaires and pencils were made available at each school to the parents and all parents had the option to complete the questionnaire and hand it back before the end of the meeting.

Each school was additionally offered the opportunity of an optional short 5-10 minute presentation to the parents, following completion and collection of the questionnaire, as an acknowledgement and appreciation for completing the relevant questionnaire. The presentation was meant for informational purposes only – called '***The value of Omega-3 in my child's diet***' *(*Appendix 11).

2.5 DATA ANALYSIS

MS Excel was used to capture the data from the questionnaire and STATISTICA version 10 (StatSoft Inc. (2011) STATISTICA (data analysis software system, www.statsoft.com) was used to analyze the data.

Summary statistics were used to describe the variables. Distributions of variables are presented with histograms and/or frequency tables. Medians or means describe measures of central location for ordinal and continuous responses respectively and quartiles and standard deviation were used as indicators of spread.

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Relationships between two continuous variables were analyzed with regression analysis and the strength of the relationship measured with the Pearson correlation or Spearman correlation if the continuous variables are not normally distributed.

The relationships between continuous response variables and nominal input variables were analyzed using analysis of variance (ANOVA) and Bonferroni multiple comparisons to see which group means differed significantly. If the data is not normally distributed a non-parametric test was used. If variables were identified which may influence the results from an ANOVA, these variables were introduced as covariates in an Analysis of Covariance (ANCOVA) to adjust the ANOVA results for these covariates.

Appropriate tests in this case is the Mann-Whitney test if there are only two groups being compared and the Kruskal-Wallis test if more than two groups were compared. Sometimes Bootstrap multiple comparisons procedures were used i.e. computer intensive re-sampling procedures were used to compare group means if and when residuals were not normally distributed.

Relations between nominal variables were investigated with contingency tables and likelihood ratio chi-square tests.

A p-value of $p<0.05$ represented statistical significance in hypothesis testing and 95% confidence intervals were used to describe the estimation of unknown parameters.

2.6 ETHICS AND LEGAL ASPECTS

The study protocol was submitted to the Committee of Human research of Stellenbosch University for ethics approval (Project number: N09/07/189).

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A letter was sent to the WCED (Appendix 7) requesting permission to conduct the study in the CoCT. On acceptance (Appendix 8), the Principals of each randomly selected school were contacted telephonically and a letter sent via email to request permission and participation in the study (Appendix 9).

As there was no identifiable information on the questionnaire, a waiver of consent was requested. The parents were informed about the research project during a parent-teachers meeting at the selected and consenting schools, after which they were requested to complete the questionnaires, which indicated:

'By completing this questionnaire you are giving consent to your participation'

By completing and returning the completed questionnaires, the parents consented to participation. Anonymity was ensured and no names had to be indicated on the questionnaires and the questionnaires were coded upon receipt.

A copy of research content, findings and recommendations are to be provided to the Director, research Services at the WCED on completion of the study.

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CHAPTER 3: RESULTS

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3.1 VALIDITY OF THE QUESTIONNAIRE

3.1.1 Content Validity

Thirteen of the 16 targeted experts with known expertise in paediatrics, fats, specifically omega-3, and/or supplementation accepted the invitation (Appendix 2) to be part of the Delphi process in content validating the research questionnaire (Appendix 5). Eleven of the 13 experts (Appendix 3) completed both rounds of the Delphi process (85% response rate). Three reminders were sent and telephonic contact was made in an attempt to improve the response rate.

The panel of experts covered a range of expertise with mostly dietitians (45.5%, n=5) and/or dietetic lecturers (9.09%, n=1) and included lecturers with expertise in either fats and/or paediatrics (27.3%, n=3), general practitioners (9.9%, n=1) and pharmacists (9.9%, n=1) (Table 3.1).

Table 3.1: Total Respondents from invited groups of Expert Panel

Groups	Total Invited	Expert Panel N[t] (%)
Dietitians	6	5 (45.5)
Dietetic Lecturers	3	1 (9.1)
Lecturers (expertise in fats and/or paediatrics)	4	3 (27.2)
General practitioners	1	1 (9.1)
Pharmacists	1	1 (9.1)
Industry	1	0 (0.0)
Grand Total	**16**	**11 (100)**

The results in the first round of the Delphi Process showed that a total of 14 out of the 28 questions for the knowledge section were agreed upon by the expert panel for inclusion and six out of the 12 questions for the trends section in the Delphi Questionnaire were agreed upon. Comments that were included in the feedback from the first round by the experts were incorporated into the questions sent out in the second round.

[t] Number of respondents

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In the second round, 12 questions in the knowledge section were sent to the expert panel and as a result of their suggestions in the first round, four of these questions also indicated choices between (a) and (b). The expert panel was asked to choose a maximum of six knowledge questions and where relevant to indicate their preferred choice between the (a) and (b) options. Five questions from the trends section were also sent in round 2 and one of these questions also indicated a choice between (a), (b) or (c). The expert panel was asked to choose a maximum of four trends questions and where relevant to indicate their preferred choice between the (a), (b) or (c) options.

Consensus (a minimum of 75%) was reached after the second round. The pilot study questionnaire for the knowledge and trends Section was compiled according to the feedback from the panel of experts.

3.1.2 Face Validity

A pilot study was conducted at School G, a medium LSM public primary school in the City of Cape Town.

All parents attending the PT meeting were invited to take part in the pilot study and 79 consented.

Following the pilot study, changes that were made to both the English and Afrikaans questionnaires, included:

- Specifying the importance of completing all the questions on the questionnaire. This was done by including '*Please answer all questions to the best of your knowledge*', which was indicated under point five of the Instructions section at the start of the questionnaire.
- At the start of section two, the following was added: *Choose the correct answer to each question. Only **ONE** answer per question. Please mark all relevant boxes with an **X**.*
- At the start of section three, the following was added: *Please mark **all** relevant boxes with an **X**.*

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- In section three, questions 2, 4, 5 and 6: the '*not applicable*' option was removed, as questions 1 and 3 of this section already indicated if the questions were applicable.

3.2 DEMOGRAPHICS OF PARTICIPANTS

Six hundred and fifty seven (n=657) parents from six public primary schools in the CoCT completed and returned the questionnaires (Figure 3.1).

The responses were divided into the three LSM groupings, with two schools per LSM group (Table 3.2). The low LSM group totaled 31% of all the parents, with 21% coming from one school B. The medium LSM group totaled 29% of all the parents, with 20% coming from one school (School C) and the high LSM group totaled 40% of all the parents, with 36% coming from one school (School F).

Table 3.2: Distribution of Parents in the three LSM groups

Schools[u]	Number (%) of Parents per LSM
Low LSM (School A, School B)	204 (31.1)
Medium LSM (School C, School D)	189 (28.7)
High LSM (School E, School F)	264 (40.2)
Total number of Parents	**657 (100)**

3.2.1 Relationship

The majority of the 657 parents were mothers n=499 (76%), 125 (19%) were fathers, 12 (2%) were grandparents and 20 (3%) indicated that they were caregivers.

3.2.2 Age

The mean age of parents was 37 years, with a minimum age of 22 years and a maximum age of 72 years. Although respondents in the low LSM group

[u] Schools in each of the 3 Living Standard Measure (LSM) groups

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seemed to be slightly younger, the mean age per LSM group did not differ significantly between the three groups (p=0.64, SD=7.28).

3.2.3 Income

A total of 633 (96.3%) parents answered the monthly household income question. The total monthly income of most parents ranged between R3501.00-R9000.00 per month.

Of the parents in the low LSM group that answered this question, 165 (82.0%) had a monthly household income of less than R2500.00. No household in the low LSM group earned more than R9000.00 or more per month. The low LSM group had a mean monthly income of just below R2500.00.
Parents in the medium LSM group that answered this question, 47 (26.1%) had a monthly household income of less than R2500.00 and only 58 (32.2%) had a monthly household income of more than R9000.00. The medium LSM had a mean monthly income of between R3501.00–R9000.00.

Of the parents in the high LSM group that answered this question, 189 (75.0%) parents had a monthly household income of more than R9000.00, with a mean average monthly income of between R9001.00–R16500.00.

The mean income differed significantly (p=0.00, SD=2.63) between the three LSM groups (Figure 3.2), this was confirmed by the Bonferroni comparisons test.

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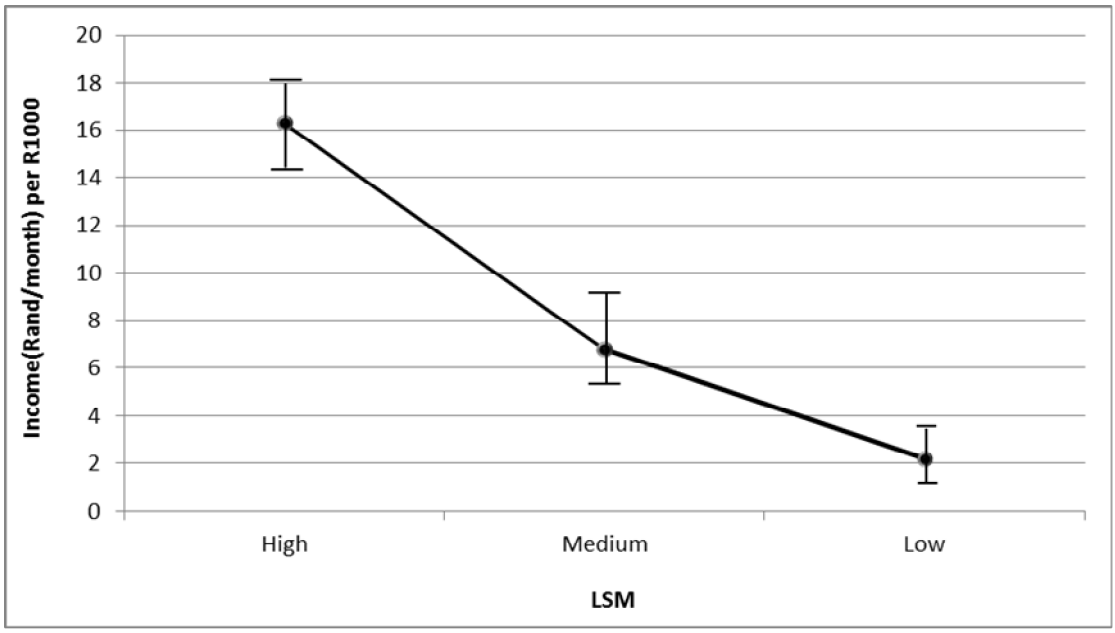

Figure 3.1: The plot of means and confidence intervals for Total Monthly Income between the three LSM[v] groups (p=0.00)

3.2.4 Education Level

Most parents had completed Secondary School (passed Grade 12). This however differed between LSM groups, with most parents in the low LSM group having completed only Primary School, those in the medium and high LSM group had completed Secondary School but in the high LSM group, more parents were likely to have a tertiary qualification (certificate, diploma).

The means and the confidence intervals (Figure 3.3) together with the results from an analysis of variance showed that the means differ significantly (p=0.00, SD=1.37), indicating that there is a significant difference in the education levels of the three LSM groups. The Kruskal–Wallis test and Bonferroni multiple comparisons procedure supported the finding that the mean level of education between each of the three LSM groups differed significantly. The high LSM group's mean education level was significantly higher than that of the medium LSM and the low LSM group's mean education level. Similarly the medium group's mean education level was significant

[v] Living Standard Measure

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higher than the low LSM group's mean education level, with the low LSM group having the lowest level of education.

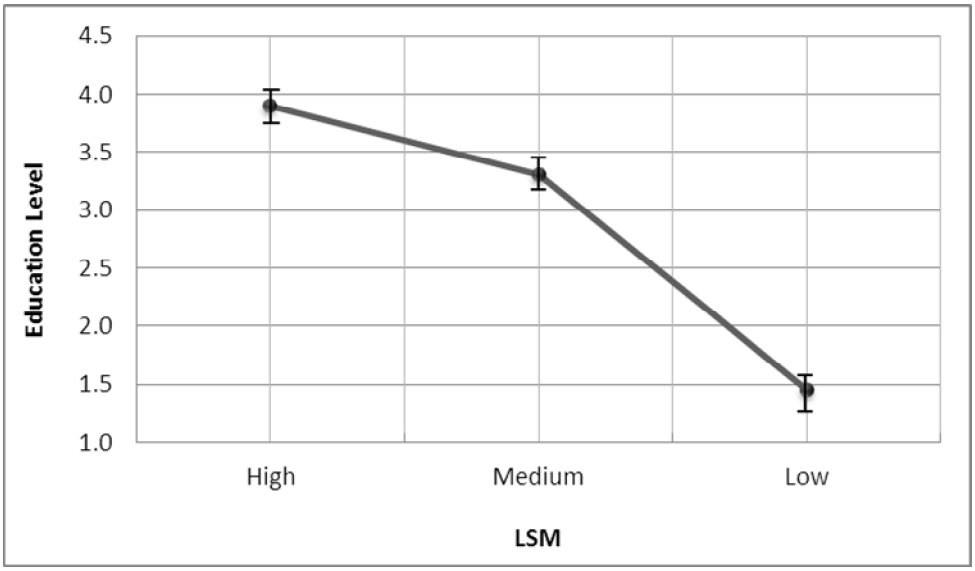

Figure 3.2: The plot of means and confidence intervals for Level of Education between the three LSM[w] groups (p=0.00)

3.2.5 Children's Grade

A total number of 776 children attending Primary School were reported by 657 parents.

The distribution of all children (n=776) per grade in an LSM grouping shows that the majority of children (n=532, 68.6%) are in Grade 1 (n=217, 28.0%), Grade 2 (n=172, 22.1%) and Grade 3 (n=143, 18.4%) (Figure 3.4). However, there is representation of children from Grades 1-7 (n=776).

[w] Living Standard Measure

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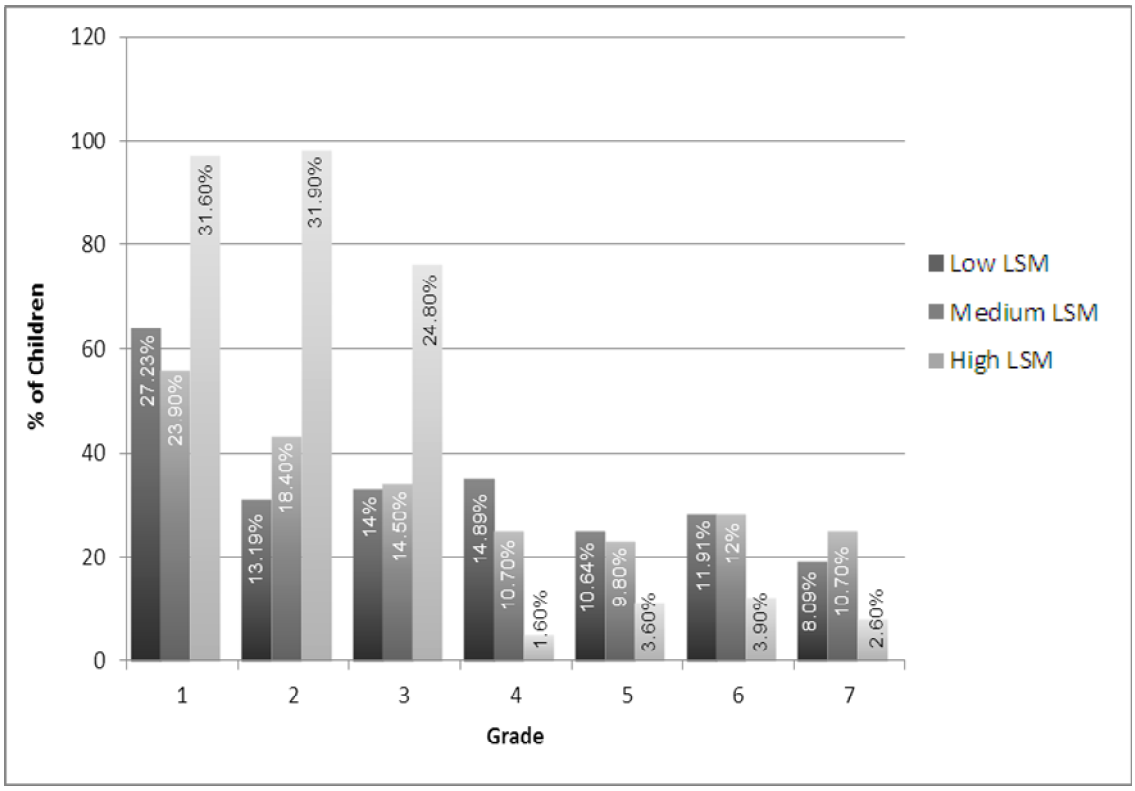

Figure 3.3: Distribution of Children per Grade within an LSM[x] grouping

3.3 OVERALL OMEGA-3 KNOWLEDGE SCORE

The overall mean knowledge score for the three LSM groupings (n=657) was 71%, with a mean knowledge score of 69% for the low LSM group (n=204), 70% mean knowledge score for the medium LSM group (n=189) and 73% for the high LSM group (n=264).

The means and the confidence intervals (Figure 3.5) differed significantly (p=0.04, SD=0.19) between the three LSM groups. The residuals were not normally distributed, so the multiple comparisons was redone with bootstrap, which confirmed that the high and low LSM groups differ significantly in terms of omega-3 knowledge (p=0.02), but that the omega-3 knowledge of the medium LSM group does not differ significantly from neither the high or low LSM group.

[x] Living Standard Measure

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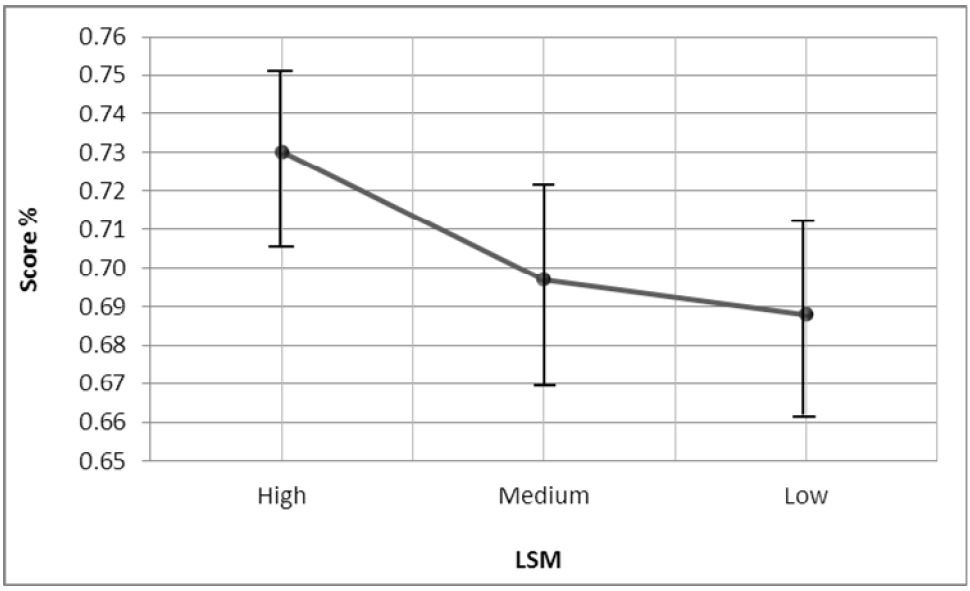

Figure 3.4: The plot of means and confidence intervals for Parent's knowledge of Omega-3 per LSM[y] group (p=0.04)

3.3.1 Evaluation of Omega-3 Knowledge Score per Question

Questions 2, 4, 11, 13 and 17 were the five questions with the highest scoring with more than 80% correct (Table 3.3). Question 2 indicated that 588 parents (89.5%) realized the importance of omega-3 as part of a healthy diet. In addition, Question 4 showed that 526 parents (80.1%) knew that omega-3 rich food sources included fish such as pilchards, sardines and snoek. Question 11, showed that 567 (86.3%) of parents knew that omega-3 played a role in increasing immunity. Question 13 also indicated that most parents (n=591, 90.0%), were aware that omega-3 may help the brain and nerve cells to function well, while 555 (84.5%) parents indicated that they knew omega-3 may play a role in keeping the heart healthy(Question 17).

The majority of all parents (n=358, 54.5%) indicated that the body produces omega-3 (Question 1), yet 588 (89.5%) of the parents simultaneously realized the importance of omega-3 as part of a healthy diet (Question 2).

[y] Living Standard Measure

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An area of concern was Question 3, where 540 (82.2%) of all parents believed that hake, sole and tinned tuna was a rich omega-3 food source. These fish are more typically consumed by the South African population.

Table 3.3: Average Knowledge Score of Omega-3 for all Parents by Question (n=657)

Knowledge Questions 1-17 from Questionnaire	Correct answers	Incorrect answers
	N (%)	N (%)
1. The body produces Omega-3.	299 (45.5)	358 (54.5)
2. Omega-3 fats are part of a healthy diet.	588 (89.5)	69 (10.5)
3. Omega-3 rich food sources include hake, sole and tinned tuna.	117 (17.8)	540 (82.2)
4. Omega-3 rich food sources include pilchards, sardines and snoek.	526 (80.1)	131 (19.9)
5. Omega-3 rich food sources include flaxseeds, walnuts and linseeds.	430 (65.5)	227 (34.6)
6. Omega-3 from plant sources is rich in alpha-linolenic acid (ALA).	348 (53.0)	309 (47.0)
7. Omega-3 from fish sources is rich in EPA (Eicosapentaenoic acid) and DHA (Docosahexaenoic acid).	409 (62.3)	248 (37.8)
8. It is more beneficial to supplement Omega-3 from a fish sources than plant sources.	511 (77.8)	146 (22.2)
9. Research has shown that Omega-3 may play a role in treating allergies.	485 (73.8)	172 (26.2)
10. Omega-3 from plant sources is rich in EPA (Eicosapentaenoic acid) and DHA (Docosahexaenoic acid) which is important for brain development.	513 (78.1)	144 (21.9)
11. Research has shown that Omega-3 may play a role in helping to increase immunity.	567 (86.3)	90 (13.7)
12. Research has shown that Omega-3 may play a role in improving behaviour.	478 (72.8)	179 (27.3)
13. Omega-3 helps the brain and nerve cells function well.	591 (90.0)	66 (10.1)
14. Research has shown that Omega-3 may play a role in eye-sight development in early childhood years.	514 (78.2)	143 (21.8)
15. Research has shown that Omega-3 may play a role in lowering blood pressure.	458 (69.7)	199 (30.3)
16. Research has shown that Omega-3 may play a role in lowering cholesterol levels.	499 (76.0)	158 (24.1)
17. Research has shown that Omega-3 may play a role in keeping the heart healthy.	555 (84.5)	102 (15.5)
TOTAL OVERALL PERCENTAGE	**71%**	

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Contingency tables with the M-L chi-square statistic were used to test if the probabilities for answering correctly in the three LSM groups (Table 3.4) were the same, i.e. testing the hypothesis H_o: p(low) = p(medium) = p(high). *Answering correctly was an indication of knowledge for that particular question.* Multiple comparisons were done by testing separately two-two at a time which probabilities amongst the three did differ, if the M-L chi-square test showed that there were significant differences among these probabilities for answering correctly. The p-values in the multiple comparisons were Bonferroni corrected for multiple testing.

Omega-3 knowledge differed significantly between the low and high and low and medium LSM groups but not between the medium and high LSM groups for Questions 1-3, 5-7 and question 16. But there was no significant difference in omega-3 knowledge between the three LSM groups for questions 8-10, 13-15 and question 17.

The omega-3 knowledge for Question 4 only differed significantly between the low LSM and medium LSM groups.

In Question 11 the omega-3 knowledge only differed significantly between the low LSM and high LSM groups and in Question 12 the low LSM group's knowledge did not differ from the high LSM group, but the medium LSM groups' knowledge was significantly less and differed from both the low and the high LSM groups.

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Table 3.4: Knowledge Score of Omega-3 per Question and per LSM grouping (n=657)

Questions	Knowledge Score per LSM[z] Group			Chi Square χ^2	P-value
	Low LSM	Medium LSM	High LSM		
	N (%)	N (%)	N (%)	df=2	(p<0.05)
1.	65(32.0)[a]	95(50.0)[b]	139(53)[b]	22.91	p= 0.00
2.	165(80.8)[a]	168(88.9)[b]	255 (97)[b]	32.04	p= 0.00
3.	61 (29.9)[a]	26(13.8)[b]	30(11.4)[b]	28.34	p= 0.00
4.	178 (87.3) [a]	35 (71.4)[b]	213(80.7)[ab]	15.47	p= 0.00
5.	104 (51.0)[a]	128(67.7)[b]	198(75.0)[b]	29.66	p= 0.00
6.	84 (41.2)[a]	107 (56.6)[b]	157(59.5)[b]	16.91	p= 0.00
7.	113 (55.4)[a]	119 (63.0)[b]	177(67.1)[b]	6.67	p= 0.03
8.	163 (80.0)[a]	135 (71.4)[a]	213(80.7)[a]	6.03	p= 0.49
9.	148 (72.6)[a]	146 (77.3)[a]	191(72.4)[a]	1.65	p= 0.44
10.	164 (80.4)[a]	141 (74.6)[a]	208(78.8)[a]	2.02	p= 0.36
11.	185 (90.7)[a]	160 (84.7)[ab]	222(84.1)[b]	5.14	p= 0.08
12.	168 (82.4)[a]	115 (60.8)[b]	195(73.9)[a]	23.09	p= 0.00
13.	182 (89.2)[a]	166 (87.8)[a]	243(92.1)[a]	2.38	p= 0.30
14.	162 (79.4)[a]	152 (80.4)[a]	200(75.8)[a]	1.64	p= 0.44
15.	133 (65.2)[a]	136 (72.0)[a]	189(71.6)[a]	2.82	p= 0.24
16.	140 (68.6)[a]	148 (78.3)[b]	211(79.9)[b]	8.60	p= 0.01
17.	169 (82.8)[a]	157 (83.1)[a]	229(86.7)[a]	1.58	p= 0.45

In the low LSM group, questions 2, 4, 11, 12, 13 and 17 had the highest scoring where 80% or more of parents indicated their replies correctly.

This indicated that the majority of parents in this group knew that omega-3 was part of a healthy diet (Question 2) and that food sources like pilchards, sardines and snoek were rich sources of omega-3 (Question 4). However, it is interesting to note that parents also considered hake, sole and tinned tuna to be rich omega-3 sources. The low LSM group however simultaneously indicated that the body also produced omega-3 (Question 1), the purpose of this question was to indicate that omega-3 at least needs to be consumed in the diet in the form of ALA before it can be converted. Plant sources like

[z] Living Standard Measure
Scores with different superscripts in the same row differed significantly from each other, which was confirmed by the Bonferroni comparisons test

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flaxseed/linseed and walnuts were not seen to be a good source of omega-3 (Question 5). In terms of lifestyle-related outcomes, the majority of the low LSM group indicated that omega-3 may play a role in increasing immunity (Question 11) (90.2%), improving behaviour (Question 12) (82.4%), helping the brain and nerve cells function well (Question 13) (89.2%) and keeping the heart healthy (Question 17)(82.8%).

Information regarding the scientific naming of omega-3 such as ALA (Question 6) (41.2%) and fish sources being rich in EPA and DHA (Question 7) (55.4%) were less well known by the parents in the group.

In the medium LSM questions 2, 11, 13, 14 and 17 had the highest scoring where 80.0% or more of parents indicated their replies correctly (Table 3.4). The majority of parents in this group knew that omega-3 was part of a healthy diet (Question 2), however it is interesting to note that half the parents (50.0%) erroneously also indicated that the body produces omega-3 (Question 1) and considered omega-3 rich food sources to be hake, sole and tinned tuna.. In terms of lifestyle-related outcomes, the majority of the medium LSM group indicated that omega-3 may play a role in increasing immunity (Question 11) (84.7%), helps the brain and nerve cells function well (Question 13) (87.8%), may play a role in eye-sight development (Question 14) (80.4%) and keeps the heart healthy (Question 17) (83.1%).

Information regarding the scientific naming of omega-3 such as ALA (Question 6) (56.6%) were less well known by the parents in the group.

The High LSM group had a better overall knowledge score of Omega-3.

Questions 2, 4, 8, 11 and 17 had the highest scoring for the high LSM group where 80.0% or more of parents indicated their replies correctly (Table 3.5 and Figure 3.6). The majority of parents in this group knew that omega-3 was part of a healthy diet (Question 2), however it is interesting to note that half the parents (53.0%) also indicated that the body produces omega-3 (Question

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1). This group knew that omega-3 rich foods included pilchards, sardines and snoek (Question 4) (80.7%), however they also considered omega-3 rich food sources to be hake, sole and tinned tuna. Leading to Question 8 where the majority (80.7%) indicated that fish oil supplements were more beneficial than omega 3 supplements from plant sources. In terms of lifestyle-related outcomes, the majority of the high LSM group indicated that omega-3 may play a role in increasing immunity (Question 11) (84.1%), and keeps the heart healthy (Question 17) (86.7%).

Information regarding the scientific naming of omega-3 such as ALA (Question 6) (59.5%) were less well known by the parents in the group.

3.3.2 Factors Influencing Omega-3 Knowledge Score

3.3.2.1 Relationship and omega-3 knowledge score

The plot of means and confidence intervals showed that there was no statistically significant difference (p=0.65) in omega-3 knowledge between mothers (M), fathers (F), grandparents (G) or care-givers (G) overall or per LSM group (p=0.46). Knowledge could therefore not be attributed to the type of relationship with the child.

3.3.2.2 Age and omega-3 knowledge score

The Spearman's correlations coefficient showed no statistically significant relationship between age and omega-3 knowledge amongst the parents (r=-0.01, p=0.77).

3.3.2.3 Income and omega-3 knowledge score

The Spearman's correlations coefficient showed a statistically significant relationship between income and omega-3 knowledge amongst all the parents (r=0.12, p=0.00).

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The ANCOVAs were done to see if the omega-3 knowledge means still differed significantly after correcting for income level. Note that the LSM groups did not differ with respect to omega-3 knowledge anymore, so after adjusting for income level, the three group means do not differ significantly any longer (p=0.82).

3.3.2.4 Education Level and omega-3 knowledge score

The Spearman's correlations coefficient showed a statistically significant relationship between education level and omega-3 knowledge amongst the parents (r=0.09, p=0.02).

The ANCOVAs were done to see if the omega-3 knowledge means still differed significantly after correcting for education level. Note that the LSM groups did not differ with respect to omega-3 knowledge anymore, so after adjusting for education level, the three group means do not differ significantly any longer (p=0.62).

3.3.2.5 Income and education level and omega-3 knowledge score

The analysis was redone in the presence of both covariates, namely income and education level per LSM group and this also indicated no significant difference in relation to omega-3 knowledge score (p=0.75).

3.4 TRENDS

3.4.1 Heard of Omega-3 Supplements

A total of 526 (80.1%) parents (n=657) had heard of omega-3 supplements prior to this research.

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In the high LSM group 231 (87.5%) parents indicated that they had heard of omega-3 supplements prior to the study, followed by 144 (76.2%) parents in the medium LSM group and 151 (74.0%) parents in the low LSM group.

In the questionnaires where parents had indicated that they had not heard of omega-3 supplements, but that their children were taking omega-3 supplements, the information was disregarded and it was decided that if the parents had not heard of omega-3 supplements, then their children could not be taking supplements. This trend was typically seen in questionnaires coded from one of the schools in the low LSM grouping, which differed from the other low LSM school (Table 3.2). If the questions were changed and interpreted as indicated above, both schools followed the same trend.

The main sources of information where all parents (n=526) indicated having heard of omega-3 supplements was from television (n=230, 35%), books (n=220, 33.5%) and the health worker (n=199, 30.3%), this group included doctors, nurses, dietitians and pharmacists (Figure 3.5).

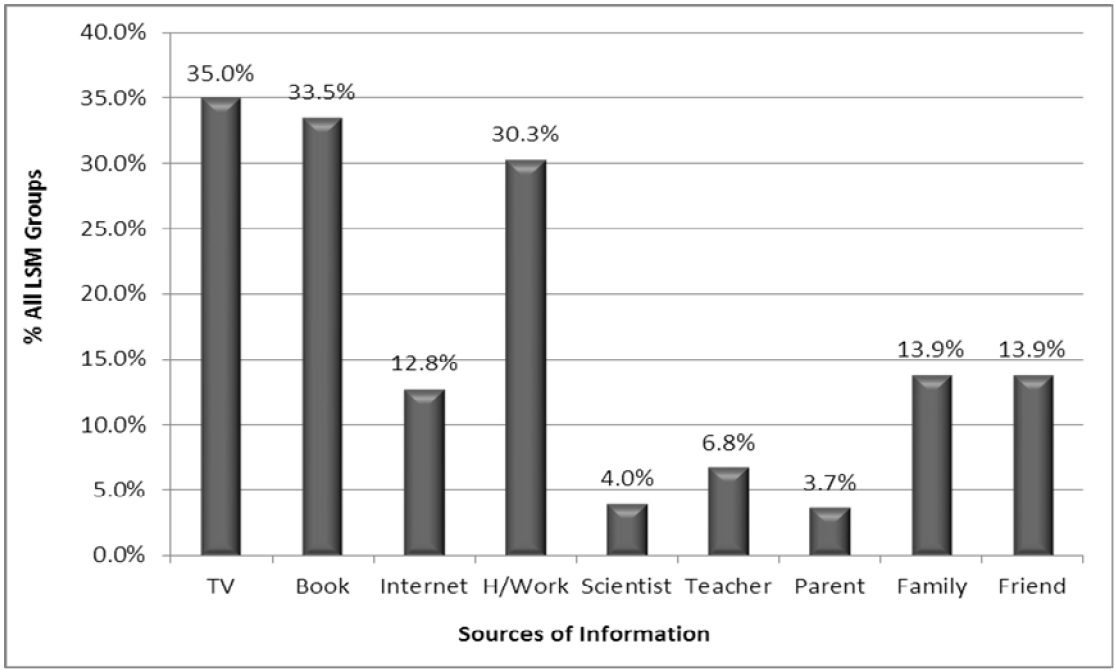

Figure 3.5: Sources of Information from which the parents in all LSM[aa] groups heard of Omega-3 supplements (n=526)

[aa] Living Standard Measure

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Additional sources of information that parents indicated where they had heard of omega-3 supplements included Golden Products (GNLD) (n=2), newspapers (n=3), weight loss groups (n=1), radio (n=1), working in the Fishing Industry (n=1) and Discovery Medical Aid (n=1).

The main sources of information where parents in the low LSM group (n=204) had heard of omega-3 supplements was from television (n=37, 18.1%), books (n=31, 15.2%) and the health worker (n=56, 27.5%), this group included doctors, nurses, dietitians and pharmacists.

The main sources of information where parents in the medium LSM group (n=189) had heard of omega-3 supplements was from television (n=93, 49.2%), books (n=65, 34.4%) and the health worker (n=59, 31.2%). Scientists/researchers (p=0.30) were not a statistically significant ($p<0.05$) source of information of omega-3 supplements.

The main sources of information where parents in the high LSM group had heard of omega-3 supplements was from books (n=124, 47.0%) television (n = 100, 37.9%), and the health worker (n=84, 31.8%). Scientists/researchers (p=0.08) and other parents (p=0.09) were not were not statistically significant ($p<0.05$) sources of information of omega-3 supplements.

Results showed that 44% of the high LSM and 27% and 29% of the medium and low LSM groups respectively had heard of omega-3 prior to the study. The means and the confidence intervals (Figure 3.6) showed that the relationship between having heard of omega-3 (n=526) prior to this research and overall knowledge of omega-3 was significantly better in each LSM group when compared to the group that had not heard of omega-3 previously (p=0.00). The analysis was repeated using non-parametric statistics with the Mann-Whitney test. This test also showed that the overall knowledge of omega-3 was significantly better (p=0.00) in parents in each LSM who had heard of omega-3 prior to the study.

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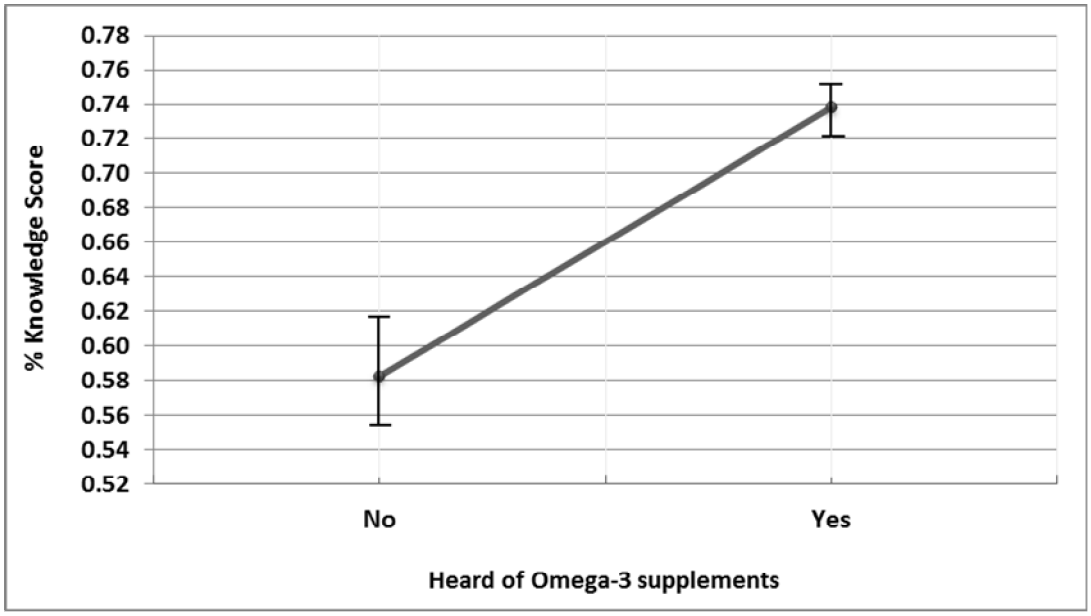

Figure 3.6: The plot of means and confidence intervals for Parents that heard of Omega-3 supplements and their knowledge of Omega-3 (n=526)

3.4.2 Take Omega-3 Supplements

Of the 657 parents, 526 (80.1%) parents had heard of omega-3 supplements, but only 253 (38.5%) parents indicated that they gave their children omega-3 supplements. It must be noted that not every parent that gave omega-3 supplements (n=253) to their child/children indicated a source of recommendation for taking omega-3, while some parents indicated more than one source of recommendation for omega-3 supplements. Possible sources of recommendation included a doctor, dietitian, pharmacist, nurse, scientist, teacher, another parent, family, friends and the parents themselves.

Parents (n=253) indicated possible sources of recommendation for omega-3 supplementation, while some parents that gave their children supplements indicated more than one source, other parents did not indicate a source of recommendation. Doctors (n=58, 22.9%) and the parents' own decision (n=60, 23.7%) to supplement were the most favoured sources of recommendation indicated overall (Figure 3.7), although all indicated sources of recommendation were significant (Table 3.5).

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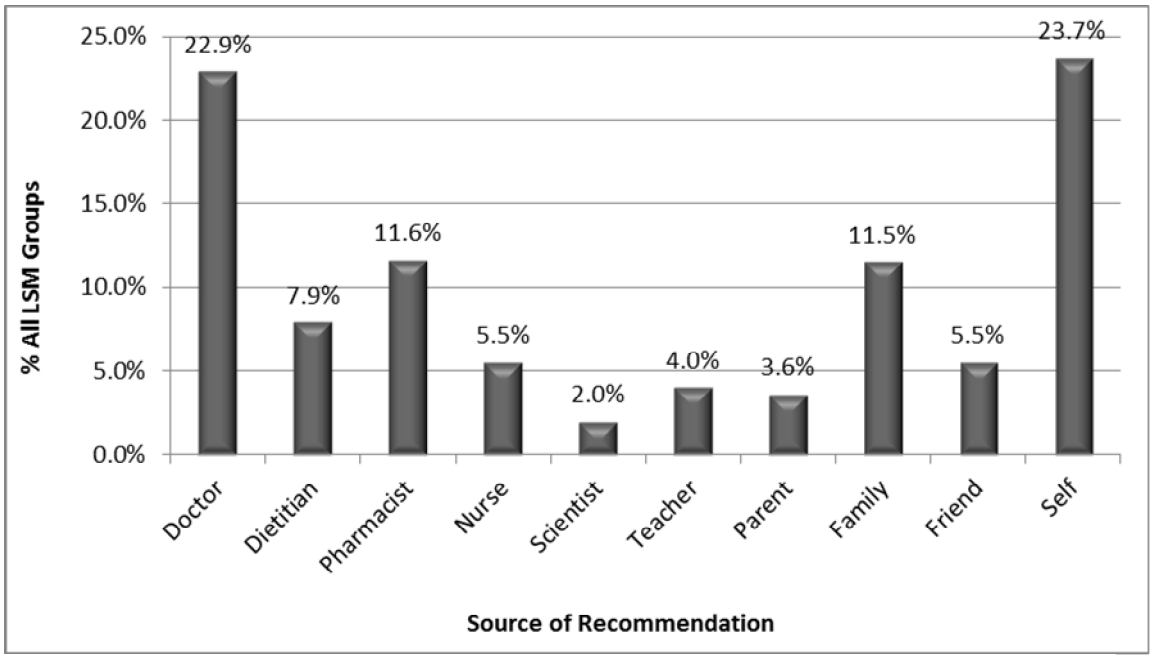

Figure 3.7: Source of recommendation of Omega-3 supplements to all Parents (n=253)

Table 3.5: Possible Sources of recommendation of Omega-3 supplements to all Parents (n=253)

Source	Parents who indicated the source of recommendation	Chi Square χ^2	P-value
	N (%)	**df=1**	**(p<0.05)**
Doctor	58 (22.9%)	139.42	p=0.00
Dietitian	20 (7.9%)	104.32	p=0.00
Pharmacist	30 (11.6%)	63.75	p=0.00
Nurse	14 (5.5%)	32.05	p=0.00
Scientist	5 (2.0%)	18.73	p=0.00
Teacher	10 (4.0%)	17.99	p=0.00
Parents	9 (3.6%)	17.15	p=0.00
Family	29 (11.5%)	61.71	p=0.00
Friend	14 (5.5%)	32.05	p=0.00
Self	60 (23.7%)	129.55	p=0.00

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In the low LSM group, 107 (52.5%) of the 204 parents indicated that they gave omega-3 supplements to their children, however, most parents did not indicate the possible sources of recommendation for omega-3 supplementation, while other parents indicated more than one source.

Doctors (n=16, 6.3%) and the parents' own decision (n=11, 4.3%) to supplement were the most favoured sources indicated overall (Figure 3.8). However, other parents were shown not to be significant source (p=0.35) of recommendation for omega-3 supplementation in the low LSM group.

In the medium LSM group, 71 (37.6%) of the 189 parents indicated that they gave omega-3 supplements to their children, however, some parents did not indicate the possible sources of recommendation for omega-3 supplementation, while other parents indicated more than one source.

Doctors (n=25, 9.9%) and the parents' own decision (n=24, 9.9%) to supplement were the most favoured sources indicated overall (Figure 3.8). However, Researchers/Scientists were shown not to be significant source (p=0.16) of recommendation for omega-3 supplementation in the medium LSM group.

The medium LSM group parents also specified that psychologists (n=1) were amongst the additional sources that had recommended omega-3 supplements.

In the high LSM group, 75 (28.4%) of the 264 parents indicated that they gave omega-3 supplements to their children, however, some parents did not indicate the possible sources of recommendation for omega-3 supplementation, while other parents indicated more than one source.

Doctors (n=17, 6.7%) and the parents' own decision (n=25, 9.9%) to supplement their children were the most favoured sources indicated overall.

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On the other hand, nurses and teachers were not significant sources (p=0.11) for recommending omega-3 supplements in the high LSM group.

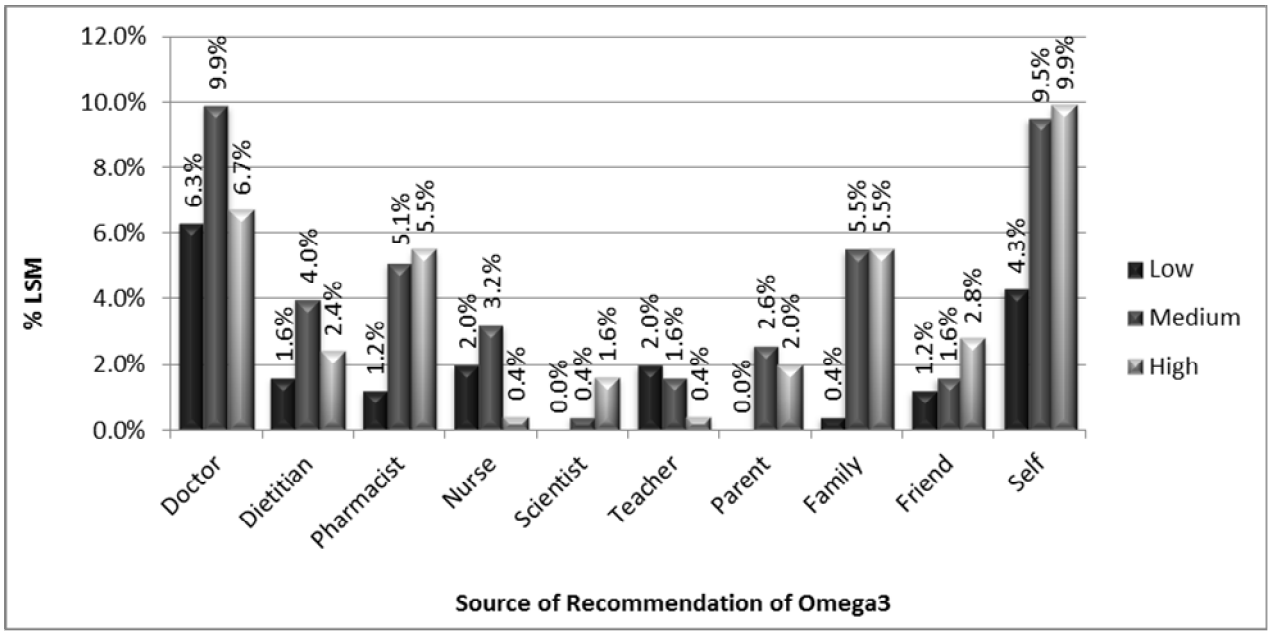

Figure 3.8: Sources of recommendation of Omega-3 supplements to Parents per LSM[bb] group (n=253)

3.4.3 Factors Influencing Taking of Omega-3 Supplements

3.4.3.1 Income and taking omega-3 supplements

The means and the confidence intervals together with the results from an analysis of variance (ANOVA) showed clearly that the mean monthly income does not differ between the parents that give their children or do not give their children omega-3 supplements per LSM group (p=0.42). While the Bonferroni multiple comparisons procedure showed that the monthly income level between LSM groups that give their children omega-3 supplements differed significantly.

[bb] Living Standard Measure

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3.4.3.2 Education level and taking omega-3 supplements

The means and the confidence intervals together with the results from an analysis of variance (ANOVA) showed clearly that the education level does not differ between the parents that give their children or do not give their children omega-3 supplements per LSM group (p=0.15). While the Bonferroni multiple comparisons procedure also showed that the education level between LSM groups that give omega-3 supplements differed significantly, except between high and medium LSM groups that give their children omega-3 supplements.

3.4.3.3 Income and education level and taing omega-3 supplements

The results for income and education level were repeated over all LSM groups and per LSM group. Since the data was not normally distributed, this was repeated non-parametrically with the Mann–Whitney tests over all three LSM groups and per LSM group.

The non-parametric tests confirm that both the income and the education level did not differ per LSM group, but income (p=0.00) and the education level (p=0.00) did differ between LSM groups for those giving their children omega-3 supplements.

3.4.3.4 Taking omega-3 supplements and omega-3 knowledge score

The means and the confidence intervals (Figure 3.9) together with the results from an analysis of variance (ANOVA) showed that the parents' mean knowledge score (74.3%) differed significantly (p=0.00) for those whose children took omega-3 supplements and the mean knowledge score (68.3%) of those parents' who did not supplement with omega-3. The analysis was repeated using non-parametric statistics with the Mann-Whitney test. This test also showed that the overall knowledge of omega-3 was significantly better

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(p=0.00) in parents who gave their children omega-3 supplements than the group that did not give supplements to their children.

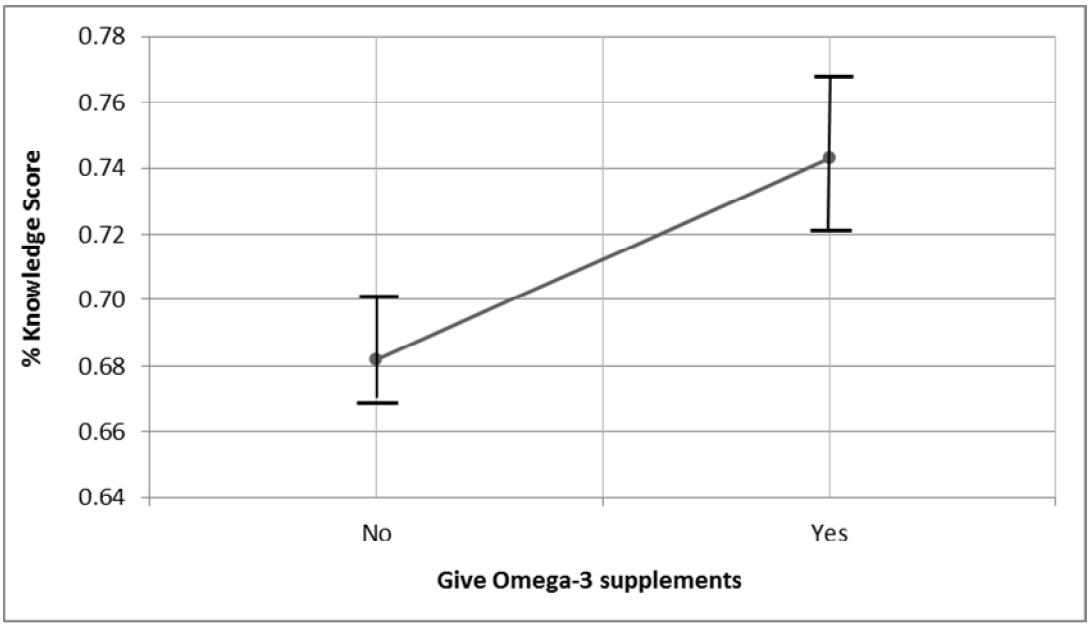

Figure 3.9: The plot of means and confidence intervals of Parents Omega-3 knowledge that gave Omega-3 supplements to their children (n=253)

3.4.4 Source of Omega-3 in Omega-3 Supplement

Marine (fish), plant (flaxseed) or a possible combination of both a fish and plant (F&P) were included in the questionnaire as possible sources of omega-3 in the omega-3 supplements.

Out of all the parents (n=253) that gave omega-3 supplements, some indicated one source or more than one source of omega-3 in omega-3 supplements, while other parents did not indicate any source or indicated that they did not know the source (n=31, 12.3%), all sources indicated were included. Most parents indicated that the omega-3 supplement they administered was from a marine source (n=105, 41.5%) (Figure 3.10).

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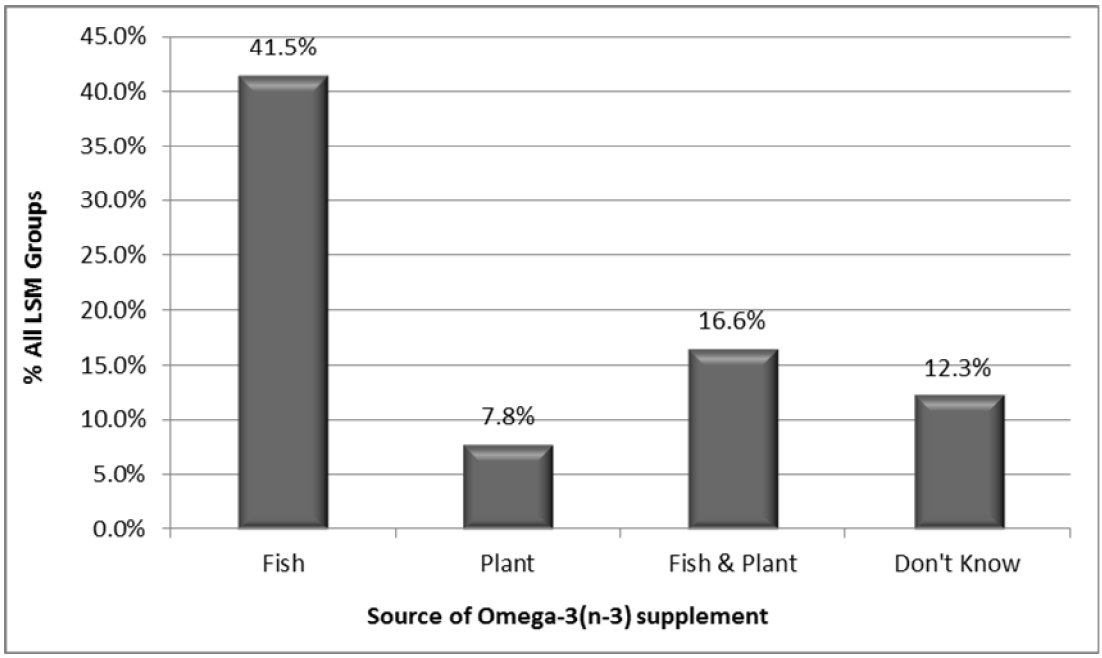

Figure 3.10: Source of Omega-3 supplement taken by all groups (n=253)

In the low LSM group, of the parents that gave omega-3 supplements, some indicated one source or more than one source of omega-3 supplements, while other parents did not indicate any source or indicated that they did not know the source (n=3, 1.2%), all sources indicated were included. Most parents indicated that the omega-3 supplement they administered was from a marine source (n= 18, 7.1%) (Figure 3.11).

In the medium LSM group, of the parents that gave omega-3 supplements, some indicated one source or more than one source of omega-3 supplements, while other parents did not indicate any source or indicated that they did not know the source (n=14, 5.5%), all sources indicated were included. Most parents indicated that the omega-3 supplement they administered was from a marine source (n=43, 17.0%) (Figure 3.11).

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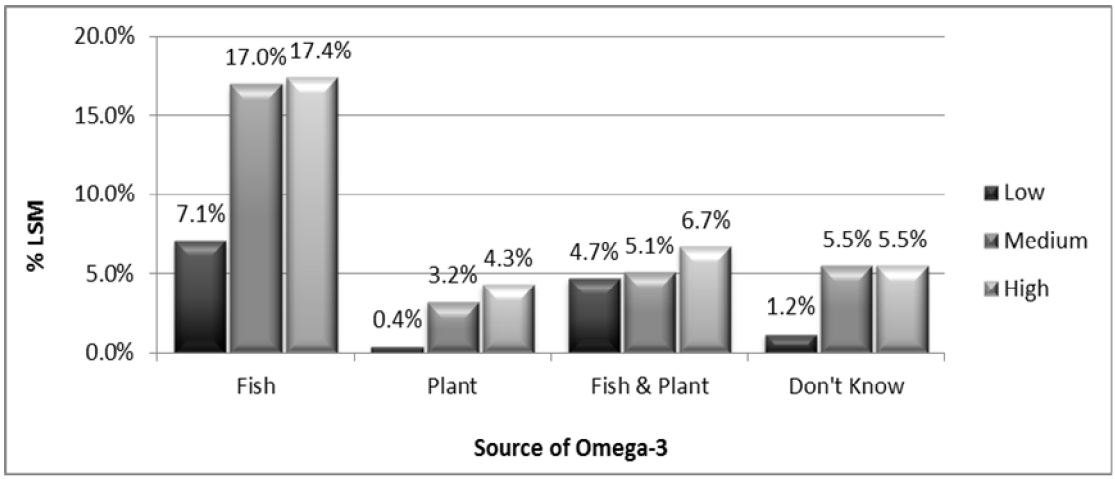

Figure 3.11: Sources of Omega-3 supplement taken per LSM group (n=253)

In the high LSM group, of the parents that gave omega-3 supplements, some indicated one source or more than one source of omega-3 supplements, while other parents did not indicate any source or indicated that they did not know the source (n=14, 5.5%) all sources indicated were included. Most parents indicated that the omega-3 supplement they administered was from a marine source (n=44, 17.4%) (Figure 3.11).

3.4.5 Omega-3 Supplement Dosage

A total of 253 parents indicated that they gave their children omega-3 supplements, 89 (35.2%) of these parents indicated the supplement dosage of omega-3 being given. Dosage was indicated for a total of 99 children, most of the children (n=90) were taking 500 mg omega-3 supplements, while 9 children were given a 1000 mg dose of omega-3 per day (Table 3.6). One parent also indicated that a daily dose of 10ml flaxseed oil was given as an omega-3 supplement.

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Table 3.6: Omega-3 supplement dosage taken by Child1, Child2 and Child3 for each LSM[cc] group

	Child1		Child2		Child3	
Dose	500mg	1000mg	500mg	1000mg	500mg	1000mg
Low LSM group	21	1	0	0	0	0
Medium LSM Group	36	1	1	0	0	0
High LSM Group	26	4	5	2	1	1
All Groups	83	6	6	2	1	1

Possible sources of recommendation for deciding to give a certain omega-3 dosage included label instructions, doctor, dietitian, pharmacist or the scientist/researcher (Figure 3.12).

Of the 657 parents, 253 (38.5%) parents indicated that they gave their children omega-3 supplements. Most parents that indicated the source of recommendation, indicating that main reason for administrating a certain dose was due to the instructions on the omega-3 supplement label (n=52, 20.6%) while 35 (13.8%) parents indicated that it was on recommendation from the doctor, simultaneously 44 (17.4%) parents indicated they did not know who had recommended the dosage (Figure 3.12).

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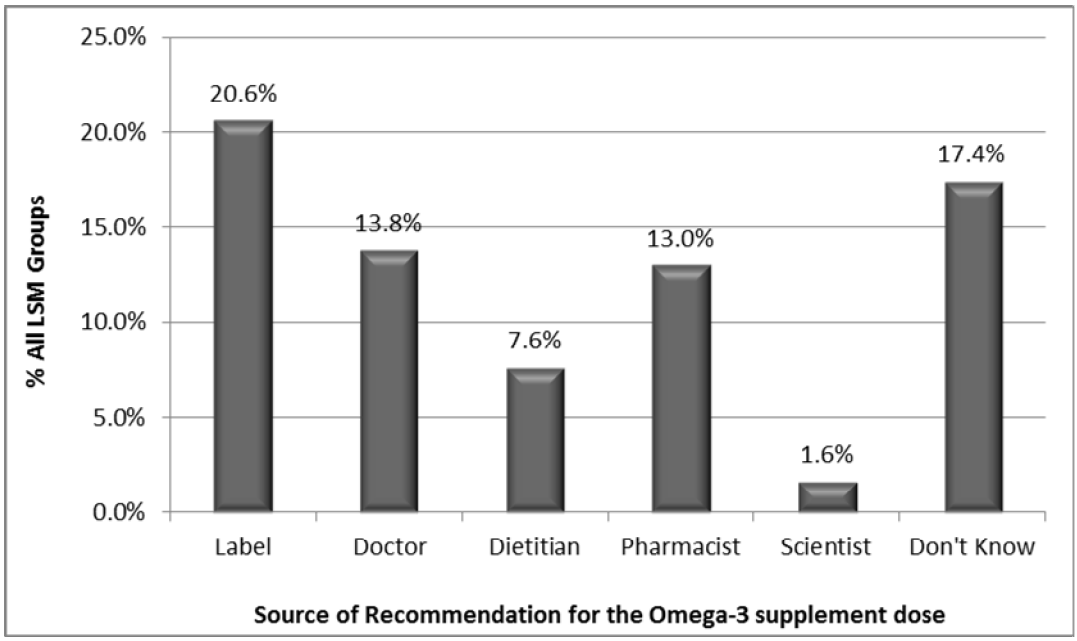

Figure 3.12: Sources of Recommendation for the Dose of Omega-3 Supplement for all 3 LSM[dd] groups (n=253)

In the low LSM group (n=204), most parents did not reply to the question. Those parents that replied to the question did indicate that the dose was recommended by the doctor (n=9, 3.6%), dietitian (n=8, 3.2%) or a pharmacist (n=7, 2.8%). Scientists/researchers (p=0.11) and label instructions were not significant sources of recommendation for omega-3 dosage in this group (Figure 3.13).

In the medium LSM group (n=189), most parents that indicated the source of recommendation, indicated that main reason for administrating a certain dose was due to the instructions on the omega-3 supplement label (n=22, 8.7%), simultaneously 22 (8.7%) parents indicated they did not know who had recommended the dosage being given (Figure 3.13).

Scientists/researchers (n=1, 0.4%) were not a significant source of recommendation (p=0.16) for omega-3 dosage in this group (Figure 3.13).

[dd] Living Standard Measure

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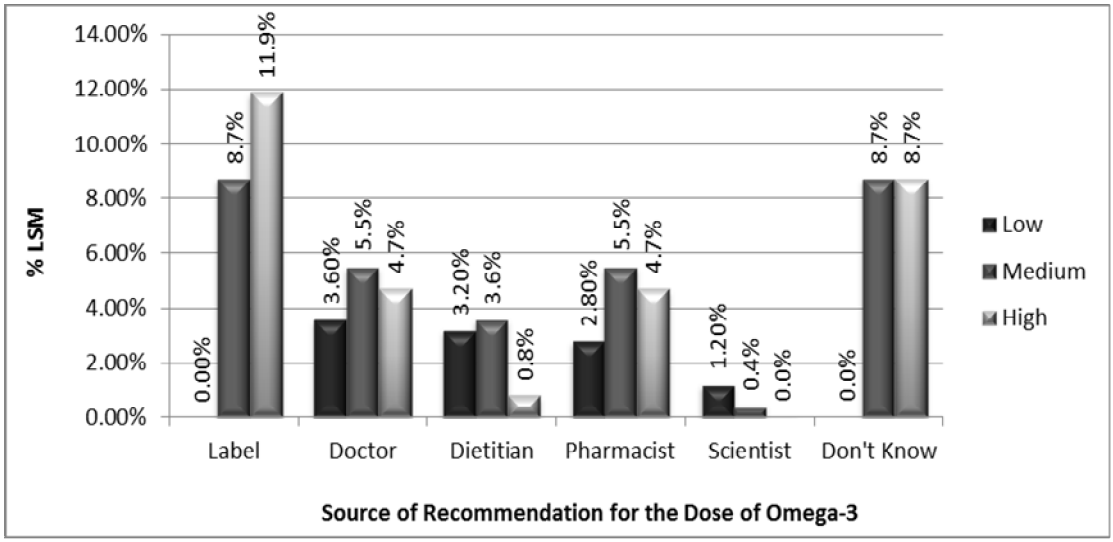

Figure 3.13: Sources of Recommendation for the Dose of Omega-3 Supplement per LSM group (n=253)

In the high LSM group (n=264), most parents that indicated the source of recommendation, indicated that main reason for administrating a certain dose was due to the instructions on the omega-3 supplement label (n=30, 11.9%), followed by 22 (8.7%) parents that indicated they did not know who had recommended the dosage being given (Figure 3.13).

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CHAPTER 4: DISCUSSION

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4.1 INITIAL OBSERVATIONS

This observational, descriptive and cross-sectional study is the first of its kind to be conducted in this population in South Africa. In addition, no other study was found that investigated the knowledge and trends of omega-3 supplementation in parents of public primary school children.

A calculated minimum representative sample size of 151 parents was initially required with a weighted stratified sample of 50 parents in each of the three LSM groups. At the PT meetings all parents attending were invited to take part in this study and complete the research questionnaire. It was requested that only one questionnaire per family be completed.

4.2 OUTCOMES

4.2.1 Demographics of Participants

A total of six hundred and fifty seven (n=657) parents from six public primary schools in the CoCT voluntarily completed and returned the questionnaires.

The majority of parents that completed the questionnaires were mothers (n=499, 76%), with an average mean age of 37 years, however in the high LSM group the mothers tended to be slightly older.

The income levels differed significantly between the three groups where the high LSM group had the highest income level. The high LSM group was also significantly better educated and more parents from this group were likely to have a tertiary qualification.

4.2.2 Knowledge Score of Omega-3

The knowledge questions were collated trying to assess a reasonable level of evidence. Overall, the omega-3 knowledge amongst the parents was good

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with a mean average scoring of 71%. The high and low LSM groups differed significantly in terms of omega-3 knowledge, but not statistically significantly once adjusted for income and education level.

Questions in the knowledge section looked at possible benefits of omega-3 in both healthy individuals and disease. Question One in the knowledge section of the research questionnaire stated that the body produces omega-3. Less than half the parents indicated that the body did produce omega-3. This question needed further clarification, in that it needs to be interpreted that the human body is able to synthesise all fats excepting two PUFAs, namely LA and ALA, therefore called essential fatty acids. However, only once ALA is obtained from the diet can it be converted to the omega-3 family of C20:5 (EPA) and C22:6 (DHA) LC-PUFA by a series of alternating desaturation and elongation reactions, yet this conversion has been shown not to be efficient in people who consume a typical Western diet.[4,13]

Question Two looked at omega-3 fats as part of a healthy diet and this was correctly understood by most parents, especially parents from the medium and high LSM groups. For the public at large, omega-3 has been shown to be beneficial for health.[12]

The parents' answers given in question three showed that most parents in all three LSM groups answered that white fish like hake, sole and tinned tuna were omega-3 rich food sources. The flesh of white fish and seafood, like sole, hake and tinned tuna, actually typically contains very low amounts of fat.[15,16] The low LSM group was significantly less aware of this differentiation in terms of white fish. This showed that although parents knew that fish was a rich source of omega-3 they were unaware which fish and that there is a difference in omega-3 content between fatty and white fish.

Yet, simultaneously most parents in all three LSM groups also answered that pilchards, sardines and snoek in question four were omega-3 rich food sources. It was unexpected that the medium LSM group was significantly less

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aware of this differentiation in terms of fatty fish. It could be considered that fish like fish fingers which typically contain hake are being fortified with omega-3 by the food industry and the claim '*high in omega-3'* is being made on these products' label and packaging.

A study by Grieger *et al*.[85] showed the same gap in omega-3 knowledge and questioned if this may contribute to lower intakes of fatty fish and perhaps confusion when choosing or purchasing fish. Increasing knowledge regarding the omega-3 contents of fish and increasing knowledge on certain types of fish with higher omega-3 content might be necessary to assist parents in identifying and choosing fish, potentially translating into increased omega-3 consumption.[85]

Questions five and six looked at plant sources of omega-3, which are rich in ALA. There was a significant difference between the low LSM groups' knowledge versus that of the medium and high LSM groups, with the latter two groups displaying a significantly better knowledge overall, but also specifically to identifying plant sources rich in omega-3.

More parents overall could identify that fish contained EPA and DHA (Question 7). There was also a significant difference in knowledge between the low LSM groups' knowledge versus that of the medium and high LSM groups, with the latter two groups displaying a significantly better knowledge overall.

All three LSM groups were equally aware of the potential benefit in omega-3 assisting in the treatment of allergies.

Question 10 raised concern on analysis as it asks two questions, firstly it indicates that EPA and DHA are found in plant sources and simultaneously it indicates that omega-3 may play a role in brain development. Firstly, this can be interpreted that a plant source like marine algae does indeed contain a source of EPA and DHA, which in turn is found in concentrated form in fatty

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fish and marine oils. However, consumption of plant sources like algae is not regularly consumed by this population group; still however, this can be seen to be a plant source of EPA and DHA.[86]

Questions 10 then looks at the role of omega-3 in brain development and questions 13 and 14 look at brain development and vision. Bradbury *et al.*[86] supports the evidence for a causal relationship between cerebral DHA phospholipids and visual acuity and brain development. It is postulated that inconsistencies could include confounding factors such as smoking, illness, gestational age, birth weight, alcohol and/or strenuous exercise during pregnancy and nutrition.[86] The knowledge overall for these questions was good with no significant differences in knowledge between the three LSM groups.

The very high percentage of correct answers given by the low LSM group for question 11 was unexpected. The low LSM had the best knowledge regarding omega-3 and its link to boosting immunity. However, it must be noted that in contrast, excessive omega-3 FA intake may be just as detrimental, leading to adverse effects of excess intake of omega-3 FA in healthy populations include suppression of the immune function.[34] The US FDA warns against an intake of more than 3000mg per day of omega-3 from fish due to possible detrimental effects associated with a very high intake.[8]

Question 12 looked at behaviour, which has great relevance in terms of children and although overall there was a good response rate to these questions and a most parents knew that omega-3 may help with behaviour. The low LSM together with the high LSM group, however, had a significantly higher knowledge in this regard. The benefits of omega-3 have also been found to be more pronounced in undernourished children and apparently healthy children from a low socio-economic status.[6]

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The perception of omega-3's benefits and what has been proven, however differs. Omega-3 FA is becoming an increasingly used term in the lay public and media as well as amongst health professionals.[8]

4.2.3 Trends in Omega-3 Supplementation

We are faced with a paradox. Health recommendations advise increased consumption of oily fish and fish oils, within limits, on the grounds that our intake is generally inadequate. However, industrial fishing has depleted the world's fish stocks by some 90% since 1950, and the rising fish prices reduce affordability particularly for people with lower incomes. Global production trends suggest that, although fish farming is expanding rapidly, we probably do not have a sustainable supply of omega-3 FA.[87]

In this study, knowledge score increased according to those who had heard of omega-3 supplementation. Statistically more parents in the high LSM group had heard of omega-3 supplements than in the medium LSM group and similarly significantly more parents in the medium LSM group had heard of omega-3 than supplements than in the low LSM group.

The three main sources from which parents had heard about omega-3 supplements were the same for all three LSM groups, which were television, books and from the health worker, this group included doctors, nurses, dietitians or pharmacists. However, the main source from which the three LSM groups had heard about omega-3 supplements differed in importance amongst the groups, with health workers being the main source for the low LSM group, television the main source for the medium LSM group and books the main source for the high LSM group.

Studies similarly showed that the most common and trusted source of health information is health workers. People do use other sources of health information, such as television, radio, print media (including newspapers,

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books and magazines), Internet, and family/friends/co-workers) to supplement information provided by health workers.[88]

In this study, 38.5% of all children were given omega-3 supplements. This was slightly higher than the results of a study done by Yoon *et al*. (2012)[89] which looked at the incidence of dietary supplement (DS) use in Korean children and adolescents where approximately 34% of Korean children and adolescents were taking DS and 28.8% were taking omega-3 supplements.

The overall omega-3 knowledge was significantly better in parents who gave their children omega-3 supplements than the group that did not give supplements to their children. Income and the education level differed between all LSM groups for those giving their children omega-3 supplements and these variables did not influence the choice to give omega-3 supplements. However, as indicated by Opperman *et al*.[34], cost was shown to play a determining role in giving omega-3 supplements. Less than a third of the omega-3 supplements were more inexpensively priced between R1.01 and R2.00 per day.

The low LSM group's good knowledge level of omega-3 and potential role in immune function and behaviour, very possibly mirrored the number of parents in this group that indicated that they gave or should give their children omega-3 supplements.

Although when it came to recommendations on giving their children omega-3 supplements, most parents either made the decision themselves or on recommendation from their medical doctor or practitioner. However, it was a concern and unexpected that a higher percentage of the low LSM group indicated that they supplemented omega-3 more than the medium or high LSM groups. A study amongst university athletes taking supplements showed that many did not know where to obtain reliable information and most were unaware that supplements could have adverse effects.[90]

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Overall, most parents indicated that the omega-3 supplement being administered was from a marine (fish) source. In the knowledge questionnaire most parents knew that omega-3 from fish source were shown to have a better health outcome. Only 35.2% of parents giving omega-3 supplements indicated they knew the dose they were administering. More high LSM parents knew the dose they were administrating. Most children were taking 500 mg omega-3 supplements. The American Heart Association (AHA) and ISSFAL both recommend an intake of about 500 mg per day [58,59,60], while the FAO[4] recommends 200-250mg for children 6-10 years of age. The main sources of recommendation for the dose being administered in the medium and high LSM groups were either unknown by most of the parents or due to the label instructions on the omega-3 supplement. Most parents from the low LSM group did not reply to this question, however, those that did indicated that health workers, namely doctors, dietitians and pharmacists, were the main source of dose recommendation in the low LSM group.

4.3 LIMITATIONS OF THE STUDY

There are some limitations to the study. Due to PT meetings being used as a forum to disseminate the research questionnaire, the main researcher was able to see that at one of the low LSM schools in the study (n=138, 21%), interaction between parents while completing the questionnaire may have influenced the answers given. Particularly that a greater percentage of the low LSM group gave their children omega-3 supplements.

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CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

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5.1 CONCLUSIONS

Collectively, most parents appear to be aware and understand the health benefits of omega-3. Overall, more parents knew that omega-3 was found in fish than in plant sources and more parents were aware that fatty fish contained EPA and DHA and that there was more beneficial health outcomes linked to supplementing with omega-3 from fish sources rather than the currently available plant sources. However, parents were unaware which fish was a rich source of omega-3 and that there is a difference in omega-3 content between fatty and white fish.

Parents who had heard of omega-3 supplementation prior to the study had a better knowledge score.

Overall knowledge of omega-3 was significantly better in parents who gave their children omega-3 supplements than the group that did not give supplements to their children. Income and the education level differed between LSM groups for those giving their children omega-3 supplements but these two variables did not influence the choice to give omega-3 supplements.

The use of media sources, particularly television and print media and the medical profession being the main sources of information and recommendation of omega-3 supplementation amongst the parents. Medium and high LSM parents also tended to make more autonomous decisions regarding omega-3 supplementation in their children.

Most parents indicated that the omega-3 supplement being administered was from a marine (fish) source, but the majority were simultaneously unaware of the dose they were giving their children.

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A greater percentage of the low LSM group indicated gave their children omega-3 supplements than the other two LSM groups this was unexpected and needs to be further investigated.

Practically, it may be a financial impossibility for the low LSM group to afford the omega-3 supplements on the market due to their monthly disposable income per family. Opperman *et al*.[34] showed that the majority of the omega-3 supplements on the South African market varied between R2.01 and R5.00 per day to meet the ISSFAL recommendation of 500 mg EPA and DHA/day.[34] While, for children aged 6-10 years, 200-250mg of EPA and DHA per day is recommended.[4] As a dietitian, a recommendation would be to focus on increasing omega-3 knowledge and availability of both naturally high and fortified in omega-3 foods into the South African market. Table 5.1 shows that 100g of Lucky Star Pilchards and Pick ‘n Pay Pilchards in Tomato Sauce gives 1361mg/100g and 1058mg/100g of EPA plus DHA, respectively.

The recommendation is that dietary advice for children (2-18 years) should be consistent with advice for the adult population of 1-2 fatty fish meals per week or approximately 250mg of EPA plus DHA per day and 1750mg of EPA plus DHA per week.[2] Therefore the recommended amount of EPA plus DHA per week by consuming Lucky Star Pilchards or Pick ‘n Pay Pilchards in Tomato Sauce offers parents the option of sufficient omega-3 together with other essential nutrients at an average of R3.29-R5.25/week or R0.47-R0.75/day.[91,92]

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Table 5.1: Nutritional Content and Pricing of two tins of *Pilchards in Tomato Sauce* in retail stores[ee] in South Africa [91,92]

(Accessed 1 November 2012)

Product Name		**Lucky Star Pilchards in Tomato Sauce[91]**		**Pick 'n Pay (PnP) Pilchards in Tomato Sauce[92]**	
Size		**400g**		**425g**	
Cost		**R14.99**		**R9.99**	
Nutrient	**Unit**	**Per 100g**	**Per 140g serving (as packed)**	**Per 100g**	**Per 140g serving (as packed)**
Energy	kJ	438	613	510	714
Protein	g	17	24	17.7	24.8
Carbohydrate	g	2	2.8	1	1
of which sugar	g	1.0	1.4	0.7	1
Total fat	g	5.1	7	5.3	7.4
Saturated Fat	g	2.0	2.8	2.4	3.4
Trans Fat	g	<0.1	<0.1	0	0
Monounsaturated Fat	g	1.2	2	1.5	2.1
Polyunsaturated Fat	g	1.8	2.5	1.5	2.1
Omega 3 Fatty Acids	mg	1625	2275	1310	1834
of which EPA	mg	963	1348	749	1049
of which DHA	mg	398	557	309	433
Omega 6 Fatty Acids	mg	NI*	NI*	170	238
Cholesterol	mg	68	95	48	67
Dietary Fibre	g	2.3	3.2	0.7	1
Sodium	mg	270	378	244	342
Selenium	mcg	35	49	NI*	NI*
Calcium	mg	267	374	NI*	NI*

5.2 RECOMMENDATIONS

- Education and public health programs that make use of different media sources, possibly include television, internet and print media as sources highlighting current recommendations for omega-3 consumption both through specific foods and supplements.
- Education and public health programs that make use of different media sources, possibly include television, internet and print media as sources highlighting possible functions and benefits of omega-3.

[ee] Not Indicated

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- Education and public health programs that make use of different media sources, possibly include television, internet and print media as sources labels and omega-3 doses for different age groups
- Target health professionals highlighting current age-specific recommendations for omega-3 consumption both through specific foods and supplements to the public and specific to the various LSM groups.
- Liaise with the food industry to assist in increasing the availability and number of foods fortified with deodorised fish oils or marine algae rich in DHA and EPA.
- As this is a landmark study of its kind in South Africa, it would be useful to do more research and repeat similar studies in the same population groups throughout various parts of South Africa, to help determine and confirm overall knowledge in parents and trends in omega-3 supplementation.
- Liaise with the government regarding omega-3 fortification of foods and labelling legislation of omega-3 food supplements.

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APPENDIX 1

RANDOM SELECTION OF PUBLIC PRIMARY SCHOOLS INCLUDED IN STUDY SAMPLE

Annual School fees in Rands	R0.00-R500.00 (LSM 1)	>R500-R1500.00 (LSM 2)	>R1500.00 (LSM 3)
Schools	School A	School C	School E
	School B	School D	School F
Pilot School on list		School G	

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APPENDIX 2: Letter of Invitation to the Delphi Group of experts

13 Warwick Road
West Beach
7441
Cell: 0824571041
Tel: 021-5541760
Fax: 021-5541760
megan@nutritionsa.com

6th September 2009

Dear Colleague

REQUEST PARTICIPATION IN RESEARCH AS PART OF DELPHI GROUP OF EXPERTS

I am currently a Masters in Nutrition student at the Division of Human Nutrition, Stellenbosch University. My research project deals with evaluating both the knowledge and current trends regarding Omega-3 (n-3) Supplementation in parents of children at Public primary schools in the City of Cape Town (CoCT).

The aim of my research is to assess the parents' current knowledge and practices of Omega-3 supplementation in their children.

For the purpose of data collection, I plan to visit six (6) Public primary schools that were randomly selected using the Microsoft Excel random generation number function. I will attend their Parent/Teacher's meeting where the questionnaire will be distributed and completed voluntarily by parents/legal guardians.

The questionnaire will comprise of three sections.

- A socio-demographic section will include 5 questions regarding age, gender, suburb, income, and education level, number of children and ages.
- A general nutritional knowledge of Omega-3 (n-3) and Omega-3 supplementation. I have consulted various nutritional textbooks in order to compile a pool of 28 True or False questions. The final questionnaire will however contain a maximum of 20 True or False questions.
- While the third section currently includes 12 questions. The final questionnaire will contain a maximum of 5-10 questions regarding trends in the usage and supplementation of Omega-3.

I hereby request your participation in my research project by serving as a member of a panel of independent experts in the field of omega-3 nutrition and/or pediatrics.

Each member will receive the pool of questions, via e-mail. It will then be expected of each member to select the 20 knowledge questions and 10 questions relating to trends.

The members will be requested to select their choice of questions and return it to the researcher via e-mail within seven days. Sections Two and Three of the pilot study questionnaire will be compiled according to the feedback from the panel of experts.

The completion of the questionnaire relies heavily on your input. It will be understood if you decide not to form part of the expert panel; however your participation in this regard will be most appreciated and very helpful to me in finalizing the questionnaire for the pilot study.

Please reply to this message by no later than Thursday the 10th of September 2009 to inform me of your decision.

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Thanking you in anticipation of your co-operation.

I look forward to hearing from you soonest.

Yours Sincerely

Megan Pentz-Kluyts RD(SA)
M. NUTRITION SUDENT
megan@nutritionsa.com

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APPENDIX 3

PANEL OF DELPHI EXPERTS

1. Dr Hein Badenhorst, General Practitioner, Johannesburg, South Africa
2. Dr Leone Craig, Research Fellow, Public Health Nutrition Research Group, University of Aberdeen, Scotland
3. Mrs Linda Dell, Kellogg's Registered Dietitian, Johannesburg, South Africa
4. Mr Allen Frank, pharmacist, Amway Corporation, South Africa
5. Mrs Yael Joffe, Registered Dietitian, Cape Town, South Africa
6. Mrs Irene Labuschagne, Registered Dietitian, Nutrition Information Centre at the University of Stellenbosch (NICUS) , South Africa
7. Dr Debbi Marais, Registered Dietitian, MSc Coordinator, Population Health, Public Health Nutrition Research Group, University of Aberdeen, Scotland
8. Mrs Rene Smalberger, Registered Dietitian, private practice, Port Elizabeth, South Africa
9. Prof Marius Smuts, Associate Professor at North-West University, Centre of Excellence in Nutrition, Potchefstroom-campus, South Africa
10. Dr Frank Thies, Senior Lecturer, Section of Translational Medical Sciences, Division of Applied Medicine, School of Medicine and Dentistry, Aberdeen
11. Mrs Dorothy van der Spuy, Registered Dietitian, private practice, Cape Town, South Africa

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APPENDIX 4

DELPHI QUESTIONNAIRE

Dear Parent/Caregiver

I am a Masters in Nutrition student at the University of Stellenbosch. My research entails assessing the current knowledge of Omega-3 (n-3) supplementation in parents of children at Public primary schools in the City of Cape Town (CoCT).

By agreeing to anonymously complete this questionnaire you hereby give me permission to use this information as part of my results. Your participation is highly appreciated and will add to the success of this study.

Thanking you for your time.
Megan Pentz-Kluyts RD (SA)

Please read the instructions before answering the questions

1. All information on this questionnaire will be kept **CONFIDENTIAL** and **ANONYMOUS**.
2. **DO NOT** put your name or address on it in order to maintain confidentiality.
3. By completing this questionnaire you are giving consent to your participation.
4. Please only complete one questionnaire per family.
5. Mark all relevant boxes (□) with an **X**.
6. Please write in those boxes that require more information if applicable.
7. For those boxes chosen as "Other". **PLEASE SPECIFY.**
8. Please answer the questions in the sequence of the questionnaire.

Office Use Only:
*School#:*_____

Section One

PERSONAL INFORMATION		
1. What is your relationship with the child(ren) at this school? ONLY CROSS(X) ONE OPTION	□ Mother	1
	□ Father	2
	□ Grandparent	3
	□ Caregiver / Legal guardian	4

2. What is your age (in years)?	_____ Years	1

3. Please indicate your *total* monthly household income. ONLY CROSS(X) ONE OPTION	□ less than R1000 (low LSM 1)	1
	□ R1001-R2500 (LSM1&2&3)	2
	□ R2501-R3500 (LSM 4& 5)	3
	□ R3501-R5500 (LSM 6)	4
	□ R5501-R9000 (LSM 7)	5
	□ R9001-R12 500 (LSM 8)	6
	□ R12 501- R16 500 (LSM 9)	7
	□ R16 501- R23 500 (LSM 10)	8
	□ more than R23 500 (high LSM 10) (source: blue section will be deleted in final questionnaire-adapted, AMPS 2008A)	9

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4. Please indicate your highest level of education. ONLY CROSS(X) ONE OPTION	□ Primary School	1
	□ Finished Primary School (passed Grade 7)	2
	□ Completed Secondary School (passed Grade 12)	3
	□ Tertiary qualification (certificate, diploma)	4
	□ Tertiary qualification (4-year Diploma or Degree)	5
	□ Post graduate qualification	6

5. Please indicate your highest level of education ONLY CROSS(X) ONE OPTION	□ Finished Primary School (completed Grade 7)	1
	□ Completed Secondary School (completed Grade 12)	2
	□ Tertiary qualification (certificate, diploma)	3
	□ Tertiary qualification (4-year Diploma or Degree)	4
	□ Post graduate qualification	5

6. In which grade(s) is your child(ren)? INDICATE ALL CHILDREN HERE(X)	□ Grade One	1
	□ Grade Two	2
	□ Grade Three	3
	□ Grade Four	4
	□ Grade Five	5
	□ Grade Six	6
	□ Grade Seven	7

Section Two

To the Expert Panel: Please select the 15-20 questions you believe are relevant and important to test the general nutritional knowledge of parents and Omega-3 supplementation of their children (true/false). Indicate your choice of questions by highlighting either yes or no in **bold.**

Please choose the correct answer to each question. Only ONE answer per question.
Please mark all relevant boxes with an **X**.

	YES / NO	
1. The body produces Omega-3.	□ FALSE	0
	□ TRUE	1

	YES / NO	
2. Omega-3 is a bad fat.	□ TRUE	0
	□ FALSE	1

	YES / NO	
3. Omega-3 fats are part of a healthy diet.	□ TRUE	1
	□ FALSE	0

	YES / NO	
4. Omega-3 rich food sources include hake, sole and tuna.	□ TRUE	0
	□ FALSE	1

	YES / NO	
5. Omega-3 rich food sources include pilchards, sardines and snoek.	□ TRUE	1
	□ FALSE	0

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		YES / NO
6. Omega-3 rich food sources include flaxseeds, walnuts and linseeds.	□ TRUE	1
	□ FALSE	0
7. Omega-3 is a polyunsaturated fat.	□ TRUE	1
	□ FALSE	0
8. Omega-3 from plant sources is rich in alpha-linolenic acid (ALA).	□ FALSE	0
	□ TRUE	1
9. Omega-3 from fish sources is rich in alpha-linolenic acid (ALA).	□ TRUE	0
	□ FALSE	1
10. Omega-3 from plant sources is rich in EPA (Eicosapentaenoic acid) and DHA (Docosahexaenoic acid).	□ TRUE	0
	□ FALSE	1
11. Omega-3 from fish sources is rich in EPA and DHA.	□ FALSE	0
	□ TRUE	1
12. It is more beneficial to supplement Omega-3 from a fish sources than plant sources.	□ FALSE	0
	□ TRUE	1
13. It is more beneficial to supplement Omega-3 from plant sources than fish sources.	□ TRUE	0
	□ FALSE	1
14. Omega-3 is anti-inflammatory.	□ TRUE	1
	□ FALSE	0
15. Research has shown that Omega-3 may play a role in treating allergies.	□ TRUE	1
	□ FALSE	0
16. Research has shown that Omega-3 may play a role in treating Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD).	□ TRUE	1
	□ FALSE	0
17. Research has shown that Omega-3 may play a role in decreasing immunity.	□ FALSE	0
	□ TRUE	1
18. Research has shown that Omega-3 may play a role in improving behaviour.	□ TRUE	1
	□ FALSE	0
19. Research has shown that Omega-3 may play a role in improving concentration.	□ TRUE	1
	□ FALSE	0

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		YES / NO
20. Omega-3 helps the brain and nerve cells function well	□ TRUE	1
	□ FALSE	0
21. Research has shown that Omega-3 may play a role in eye-sight in early childhood development.	□ TRUE	1
	□ FALSE	0
22. Research has shown that Omega-3 may play a role in lowering cholesterol.	□ TRUE	1
	□ FALSE	0
23. Research has shown that Omega-3 may play a role in lowering blood pressure.	□ TRUE	1
	□ FALSE	0
24. Research has shown that Omega-3 may play a role in increasing blood pressure.	□ TRUE	0
	□ FALSE	1
25. Research has shown that Omega-3 may play a role in treatment of diabetes.	□ TRUE	1
	□ FALSE	0
26. Research has shown that Omega-3 may play a role in keeping the heart healthy.	□ TRUE	1
	□ FALSE	0
27. Research has shown that Omega-3 may play a role in treatment of arthritis.	□ TRUE	1
	□ FALSE	0
28. Research has shown that Omega-3 may play a role in the prevention of cancer.	□ TRUE	1
	□ FALSE	0

Section Three

To the Expert Panel: Please select the 5-10 questions you believe are relevant and important to trends regarding the usage and supplementation of Omega-3 in children. Please indicate your choice by highlighting either yes or no in **bold.**

		YES / NO
1. Have you heard of Omega-3 supplements, before today?	□ YES	1
	□ NO	0
2. If you answered 'yes' to Question 1 above, where did you hear about Omega-3 supplements? (indicate all applicable sources)	□ TELEVISION	1
	□ BOOKS	2
	□ INTERNET	3
	□ HEALTH WORKER (INCLUDES DOCTOR, NURSE, DIETITIAN,	4

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	PHARMACIST)	
	□ RESEARCHERS/ SCIENTISTS	5
	□ TEACHER	6
	□ ANOTHER PARENT	7
	□ FAMILY	8
	□ FRIENDS	9
	□ OTHER, PLEASE SPECIFY HERE	10
	□ NOT APPLICABLE	11

	YES / NO	
3. Do any of your children attending this Primary school take Omega-3 supplements?	□ YES	1
	□ NO	0

	YES / NO	
4. If you answered yes to Question 3 above, who recommended Omega-3 supplements to you? (<u>indicate all applicable sources</u>)	□ DOCTOR	1
	□ DIETITIAN	2
	□ PHARMACIST	3
	□ NURSE	4
	□ RESEARCHERS/ SCIENTISTS	5
	□ TEACHER	6
	□ ANOTHER PARENT	7
	□ FAMILY	8
	□ FRIENDS	9
	□ SELF	10
	□ OTHER, PLEASE SPECIFY HERE	11
	□ NOT APPLICABLE	12

	YES / NO	
5. Do any of your children attending this Primary school suffer from medical conditions where Omega-3 supplements have been recommended?	□ YES	1
	□ NO	0

	YES / NO	
6. If you give your child Omega-3 supplements, are they from a fish (marine) source?	□ NO	0
	□ YES	1
	□ DON'T KNOW	2
	□ NOT APPLICABLE	3

	YES / NO	
7. If you give your child Omega-3 supplements, are they from a plant (e.g. flaxseed) source?	□ NO	0
	□ YES	1
	□ DON'T KNOW	2
	□ NOT APPLICABLE	3

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		YES / NO
8. If you give your child Omega-3 supplements, are they a combination of Omega-3 and Omega-6?	□ NO	0
	□ YES	1
	□ DON'T KNOW	2
	□ NOT APPLICABLE	3

		YES / NO
9. Do you give any of your children attending this Primary school cod-liver oil supplements?	□ NO	0
	□ YES	1

		YES / NO
10. If you give your child Omega-3 supplements, in what form are they given to your child?	□ OIL CAPSULE	1
	□ GUMMY	2
	□ LIQUID	3
	□ POWDER	4
	□ OTHER FORM, PLEASE SPECIFY HERE	5

		YES / NO
11. If you give your child Omega-3 supplements, who/what recommended the dose of Omega-3 per day?	□ DIRECTIONS ON LABEL	1
	□ DOCTOR	2
	□ DIETITIAN	3
	□ PHARMACIST	4
	□ RESEARCHERS/ SCIENTISTS	5
	□ DON'T KNOW	6
	□ OTHER, PLEASE SPECIFY HERE	7
	□ NOT APPLICABLE	8

		YES / NO
12. If you give your child Omega-3 supplements, what is their dose of Omega-3 per day?	□ 250mg	1
	□ 500mg	2
	□ 1000mg	3
	□ 1500mg	4
	□ DON'T KNOW	5
	□ OTHER AMOUNT, PLEASE SPECIFY HERE	6
	□ NOT APPLICABLE	7

Thank you.
Thank you for your participation in this survey, your time is most appreciated.

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APPENDIX 5

RESEARCH QUESTIONNAIRE

Dear Parent/Caregiver

I am a Masters in Nutrition student at the University of Stellenbosch. My research entails assessing the current knowledge of Omega-3 (n-3) supplementation in parents of children at Public primary schools in the City of Cape Town (CoCT).

By agreeing to anonymously complete this questionnaire you hereby give me permission to use this information as part of my results.

Your participation is highly appreciated and will add to the success of this study.

Thanking you for your time.

Megan Pentz-Kluyts RD (SA)

Please read the instructions before answering the questions

1. All information on this questionnaire will be kept **CONFIDENTIAL** and **ANONYMOUS**.
2. **DO NOT** put your name or address on it in order to maintain confidentiality.
3. By completing this questionnaire you are giving consent to your participation.
4. Please only complete one questionnaire per family.
5. Mark all relevant boxes (□) with an **X**. Please answer all questions to the best of your knowledge.
6. Please write in those boxes that require more information if applicable.
7. For those boxes chosen as "Other". **PLEASE SPECIFY.**
8. Please answer the questions in the sequence of the questionnaire.

Office Use Only:

*School#:*_____

SECTION ONE

Please answer **ALL** questions.

PERSONAL INFORMATION		
1. What is your relationship with the child/children at this school? ONLY CROSS(X) ONE OPTION	□ Mother	1
	□ Father	2
	□ Grandparent	3
	□ Caregiver / Legal guardian	4

2. What is your age (in years)?	_____ Years	1

3. Please indicate your *total* monthly household income. ONLY CROSS(X) ONE OPTION	□ less than R1000	1
	□ R1001-R2500	2
	□ R2501-R3500	3
	□ R3501-R5500	4
	□ R5501-R9000	5
	□ R9001-R12 500	6
	□ R12 501- R16 500	7

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	□ R16 501- R23 500	8
	□ more than R23 500	9

4. Please indicate your highest level of education. ONLY CROSS(X) ONE OPTION	□ Primary School	1
	□ Finished Primary School (passed Grade 7)	2
	□ Completed Secondary School (passed Grade 12)	3
	□ Tertiary qualification (certificate, diploma)	4
	□ Tertiary qualification (4-year Diploma or Degree)	5
	□ Post graduate qualification	6

5. In which grade(s) is your child/children? INDICATE ALL CHILDREN HERE(X)	□ Grade One	1
	□ Grade Two	2
	□ Grade Three	3
	□ Grade Four	4
	□ Grade Five	5
	□ Grade Six	6
	□ Grade Seven	7

PLEASE TURN OVER FOR PAGE 3

SECTION TWO

Please answer **ALL** questions. Choose the correct answer to each question. Only **ONE** answer per question.
Please mark all relevant boxes with an **X**.

1. The body produces Omega-3.	□ TRUE	0
	□ FALSE	1
2. Omega-3 fats are part of a healthy diet.	□ TRUE	1
	□ FALSE	0
3. Omega-3 rich food sources include hake, sole and tinned tuna.	□ TRUE	0
	□ FALSE	1
4. Omega-3 rich food sources include pilchards, sardines and snoek.	□ TRUE	1
	□ FALSE	0
5. Omega-3 rich food sources include flaxseeds, walnuts and linseeds.	□ TRUE	1
	□ FALSE	0
6. Omega-3 from plant sources is rich in alpha-linolenic acid (ALA).	□ TRUE	1
	□ FALSE	0
7. Omega-3 from fish sources is rich in EPA (Eicosapentaenoic acid) and DHA (Docosahexaenoic acid).	□ TRUE	1
	□ FALSE	0
8. It is more beneficial to supplement Omega-3 from a fish sources than plant sources.	□ TRUE	1
	□ FALSE	0
9. Research has shown that Omega-3 may play a role in treating allergies.	□ TRUE	1
	□ FALSE	0
10. Omega-3 from plant sources is rich in EPA (Eicosapentaenoic acid) and DHA (Docosahexaenoic acid) which is important for brain development.	□ TRUE	0
	□ FALSE	1

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11. Research has shown that Omega-3 may play a role in helping to increase immunity.	□ TRUE	1
	□ FALSE	0
12. Research has shown that Omega-3 may play a role in improving behaviour.	□ TRUE	1
	□ FALSE	0

PLEASE TURN OVER FOR PAGE 4

13. Omega-3 helps the brain and nerve cells function well.	□ TRUE	1
	□ FALSE	0
14. Research has shown that Omega-3 may play a role in eye-sight development in early childhood years.	□ TRUE	1
	□ FALSE	0
15. Research has shown that Omega-3 may play a role in lowering blood pressure.	□ TRUE	1
	□ FALSE	0
16. Research has shown that Omega-3 may play a role in lowering cholesterol levels.	□ TRUE	1
	□ FALSE	0
17. Research has shown that Omega-3 may play a role in keeping the heart healthy.	□ TRUE	1
	□ FALSE	0

SECTION THREE

Please answer **ALL** questions. Please mark **all** relevant boxes with an **X**.

1. Have you heard of Omega-3 supplements, before today?	□ YES	1
	□ NO	0

2. If you answered 'yes' to Question 1 above, where did you hear about Omega-3 supplements? INDICATE (X) ALL APPLICABLE SOURCE(S)	□ TELEVISION	1
	□ BOOKS	2
	□ INTERNET	3
	□ HEALTH WORKER (INCLUDES DOCTOR, NURSE, DIETITIAN, PHARMACIST)	4
	□ RESEARCHERS/ SCIENTISTS	5
	□ TEACHER	6
	□ ANOTHER PARENT	7
	□ FAMILY	8
	□ FRIENDS	9
	□ OTHER (PLEASE SPECIFY HERE)	10

3. Do any of your children attending this Primary school take Omega-3 supplements?	□ YES	1
	□ NO	0

PLEASE TURN OVER FOR PAGE 5

4. If you answered yes to Question 3 above, who recommended Omega-3 supplements to you? INDICATE (X) ALL APPLICABLE SOURCE(S)	□ DOCTOR	1
	□ DIETITIAN	2
	□ PHARMACIST	3
	□ NURSE	4
	□ RESEARCHERS/ SCIENTISTS	5
	□ TEACHER	6
	□ ANOTHER PARENT	7

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	□ FAMILY	8
	□ FRIENDS	9
	□ SELF	10
	□ OTHER (PLEASE SPECIFY HERE)	11

5. If you give your child Omega-3 supplements, please specify the source they are from?	□ FISH(Marine)	0
	□ PLANT(Flaxseed)	1
	□ FISH AND PLANT	2
	□ DON'T KNOW	3

6. If you give your child Omega-3 supplements, what is their dose of Omega-3 per day? IF THE DOSES DIFFER, PLEASE INDICATE (X) ALL APPLICABLE DOSES	□ 250mg	1
	□ 500mg	2
	□ 1000mg	3
	□ 1500mg	4
	□ DON'T KNOW	5
	□ OTHER AMOUNT, (PLEASE SPECIFY HERE)	6

PLEASE TURN OVER FOR PAGE 6

7. If you give your child Omega-3 supplements, who/what recommended the dose of Omega-3 per day?	□ DIRECTIONS ON LABEL	1
	□ DOCTOR	2
	□ DIETITIAN	3
	□ PHARMACIST	4
	□ RESEARCHERS/ SCIENTISTS	5
	□ DON'T KNOW	6
	□ OTHER (PLEASE SPECIFY HERE)	7

END OF QUESTIONNAIRE

Thank you for your participation in this research, your time is most appreciated.

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APPENDIX 6

VRAELYS

Geagte Ouer/Voog

Ek is ‘n Meester in Voeding student aan die Universiteit van Stellenbosch. My navorsing behels die bepaling van die huidige kennis van ouers met kinders in publieke laerskole in die Stad van Kaapstad (SvKS) rakende Omega 3 (n-3) supplementasie .

Deur in te stem om anoniem hierdie vraelys te voltooi, gee jy my hiermee toestemming om hierdie inligting as deel van my uitslae te gebruik.

Jou deelname word baie waardeer en sal bydra tot die sukses van my studie.

By voorbaat dank vir jou tyd.

Megan Pentz-Kluyts RD (SA)

Lees asseblief die instruksies voor jy die vrae beantwoord

1. Alle inligting in die vraelys sal **KONFIDENSIEEL** en ANONIEM bly.
2. **MOET ASSEBLIEF NIE** jou naam of adres op die vraelys skryf nie, om te verseker dat dit vertroulik bly.
3. Deur die vraelys te voltooi gee jy toestemming vir jou deelname.
4. Voltooi asseblief net een vraelys per familie.
5. Merk alle relevante blokkebokse (□) met ‘n **X**.Antwoord asseblief alle vrae tot die bes van jou kennis.
6. Indien van toepassing, skryf asseblief in dié blokke waar meer inligting benodig word.
7. Vir die blokke waar jy “Ander” gemerk het. **SPESIFISEER ASSEBLIEF**.
8. Antwoord assbelief die vrae in die volgorde van die vraelys.

Vir kantoor gebruik:

*Skool#:*_____

AFDELING EEN

Antwoord asseblief **ALLE** vrae.

PERSOONLIKE INLIGTING		
1. Wat is jou verhouding met die kind/kinders in die skool? MERK(X) ASSEBLIEF NET EEN OPSIE	□ Moeder	1
	□ Vader	2
	□ Grootouer	3
	□ Versorger/Wetlike voog	4

2. Wat is jou ouderdom (in jare)?	_____ Jaar	1

3. Dui asseblief jou *totale* maandlikse huishoudelike inkomste aan. MERK(X) ASSEBLIEF NET EEN OPSIE	□ minder as R1000	1
	□ R1001-R2500	2
	□ R2501-R3500	3
	□ R3501-R5500	4
	□ R5501-R9000	5
	□ R9001-R12 500	6
	□ R12 501- R16 500	7
	□ R16 501- R23 500	8
	□ meer as R23 500	9

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4. Dui asseblief jou hoogste vlak van opleiding aan. MERK(X) ASSEBLIEF NET EEN OPSIE	□ Primêre Skool	1
	□ Klaar met Primêre Skool (Graad 7 geslaag)	2
	□ Klaar met Sekondêre Skool (Graad 12 geslaag)	3
	□ Tertiêre kwalifikasie (sertifikaat, diploma)	4
	□ Tertiêre kwalifikasie (4-jaar diploma of graad)	5
	□ Nagraadse kwalifikasie	6

5. In watter graad/grade is jou kind/kinders? MERK ALLE KINDERS HIER(X)	□ Graad Een	1
	□ Graad Twee	2
	□ Graad Drie	3
	□ Graad Vier	4
	□ Graad Vyf	5
	□ Graad Ses	6
	□ Graad Sewe	7

BLAAI ASSEBLIEF OM VIR BLADSY 3

AFDELING TWEE

Antwoord asseblief **ALLE** vrae. Kies die korrekte antwoord vir elke vraag. Net **EEN** antwoord per vraag.
Merk asseblief al die relevante blokke met 'n **X**.

1. Die liggaam vervaardig Omega-3.	□ WAAR	0
	□ ONWAAR	1
2. Omega-3 vette is deel van 'n gesonde dieet.	□ WAAR	1
	□ ONWAAR	0
3. Omega-3 ryke voedselbronne sluit in stokvis, tongvis en geblikte tuna.	□ WAAR	0
	□ ONWAAR	1
4. Omega-3 ryke voedselbronne sluit in sardyne, sardientjies (pilchards) en snoek.	□ WAAR	1
	□ ONWAAR	0
5. Omega-3 ryke voedselbronne sluit in vlassaad, okkerneute en lynsaad.	□ WAAR	1
	□ ONWAAR	0
6. Omega-3 van plantaardige bronne is ryk aan alpha-linoleensuur (ALA).	□ WAAR	1
	□ ONWAAR	0
7. Omega-3 van vis bronne is ryk aan EPA (Eikosapentaenoësuur) en DHA (dokosaheksaënoësuur).	□ WAAR	1
	□ ONWAAR	0
8. Dit is meer voordelig om Omega-3 te supplementeer vanaf 'n visbron as 'n plantbron.	□ WAAR	1
	□ ONWAAR	0
9. Navorsing het getoon dat Omega-3 'n rol kan speel in die behandeling van allergieë.	□ WAAR	1
	□ ONWAAR	0
10. Omega-3 van plantaardige bronne is ryk aan EPA (Eikosapentaenoësuur) en DHA (dokosaheksaënoësuur) wat belangrik is vir die ontwikkeling van die brein.	□ WAAR	0
	□ ONWAAR	1
11. Navorsing het getoon dat Omega-3 'n rol kan speel om immuniteit te help verbeter.	□ WAAR	1
	□ ONWAAR	0

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12. Navorsing het getoon dat Omega-3 ‘n rol kan speel in die verbetering van gedrag.	□ WAAR	1
	□ ONWAAR	0

BLAAI ASSEBLIEF OM VIR BLADSY 4

13. Omega-3 help die brein en senuwee selle om goed te funksioneer.	□ WAAR	1
	□ ONWAAR	0

14. Navorsing het getoon dat Omega-3 ‘n rol kan speel in ontwikkeling van sig tydens die vroeë kinderjare.	□ WAAR	1
	□ ONWAAR	0

15. Navorsing het getoon dat omega-3 'n rol kan speel in die verlaging van bloeddruk.	□ WAAR	1
	□ ONWAAR	0

16. Navorsing het getoon dat omega-3 'n rol kan speel in die verlaging van cholesterol-vlakke.	□ WAAR	1
	□ ONWAAR	0

17. Navorsing het getoon dat omega-3 'n rol kan speel in die behoud van die hart se gesondheid.	□ WAAR	1
	□ ONWAAR	0

AFDELING DRIE

Antwoord asseblief **ALLE** vrae. Merk asseblief al die relevante blokke met ‘n **X**.

1. Het jy voor vandag van Omega-3 supplemente gehoor?	□ JA	1
	□ NEE	0

2. Indien jy ‘ja’ geantwoord het op Vraag 1 hierbo, waar het jy van Omega-3 supplemente gehoor? MERK(X) ASSEBLIEF ALLE BRONNE WAT VAN TOEPASSING IS	□ TELEVISIE	1
	□ BOEKE	2
	□ INTERNET	3
	□GESONDHEIDSWERKERS (INSLUITEND DOKTERS, VERLEEGSTERS, DIEETKUNDIGES, APTEKERS)	4
	□ NAVORSERS/ WETENSKAPLIKES	5
	□ ONDERWYSER	6
	□ ‘N ANDER OUER	7
	□ FAMILIE	8
	□ VRIENDE	9
	□ ANDER(SPESIFISEER ASSEBLIEF HIER)	10

3. Neem enige van jou kinders wat die laerskool bywoon Omega-3 supplemente?	□ JA	1
	□ NEE	0

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BLAAI ASSEBLIEF OM VIR BLADSY 5

4. Indien jy 'ja' geantwoord het op Vraag 3 hierbo , wie het Omega-3 supplemente vir jou aanbeveel? MERK(X) ASSEBLIEF ALLE BRONNE WAT VAN TOEPASSING IS	□ DOKTER	1
	□ DIEETKUNDIGE	2
	□ APTEKER	3
	□ VERPLEEGSTER	4
	□ NAVORSERS/ WETENSKAPLIKS	5
	□ ONDERWYSER	6
	□ 'N ANDER OUER	7
	□ FAMILIE	8
	□ VRIENDE	9
	□ EK SELF	10
	□ ANDER (SPESIFISEER ASSEBLIEF HIER)	11

5. Indien jy jou kind Omega-3 supplemente gee, spesifiseer asseblief die bron waarvan dit verwaardig is?	□ VIS(Mariene)	0
	□ PLANT(Vlassaad = Flaxseed)	1
	□ VIS EN PLANT	2
	□ EK WEET NIE	3

6. Indien jy jou kind Omega-3 supplemente gee, wat is die dosis van hul Omega-3 per dag? INDIEN DIE DOSISSE, VERSKIL, MERK(X) ASSEBLIEF ALLE DOSISSE WAT VAN TOEPASSING IS	□ 250mg	1
	□ 500mg	2
	□ 1000mg	3
	□ 1500mg	4
	□ EK WEET NIE	5
	□ ANDER HOEVEELHEID (SPESIFISEER ASSEBLIEF HIER)	6

BLAAI ASSEBLIEF OM VIR BLADSY 6

7. Indien jy jou kind Omega-3 supplemente gee, wie/wat het die dosis van Omega-3 per dag aanbeveel?	□ AANWYSINGS OP ETIKET	1
	□ DOKTER	2
	□ DIEETKUNDIGE	3
	□ APTEKER	4
	□ NAVORSERS/ WETENSKAPLIKS	5
	□ EK WEET NIE	6
	□ ANDER (SPESIFISEER ASSEBLIEF HIER)	7

EINDE VAN VRAELYS

Dankie vir jou deelname aan hierdie navorsing, jou tyd word baie waardeer.

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APPENDIX 7

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
jou kennisvennoot • your knowledge partner

19 January 2010

Aan wie dit mag aangaan

Nagaan van taal in vraelyste vir navorsingsprojek

Ek wil hiermee graag bevestig dat ek die Afrikaanse DELPHI vraelys nagegaan het vir korrekte taalgebruik. Die vraelys is ook vergelyk met die Engelse weergawe om te verseker dat die vraelys inhoudelik dieselfde is. Kommentaar is gelewer aan die student in die vorm van "Track Changes".

Vir enige verdere navrae in hierdie verband, kontak my asseblief gerus by (021) 938 9597.

Vriendelike Groete

Nelene Koen
Lektor: Voedseldiensbestuur
Afdeling Menslike Voeding
Universiteit van Stellenbosch

Fakulteit Gesondheidswetenskappe ' Faculty of Health Sciences

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Webblad / Web page: www.sun.ac.za/nutrition; www.sun.ac.za/nicus

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jou kennisvennoot • your knowledge partner

APPENDIX 8

13 Warwick Road
West Beach
7441
Cell: 0824571041
Tel: 021-5541760
Fax: 021-5541760
megan@nutritionsa.com

HEAD: EDUCATION
c/o Dr Cornelissen
Western Cape Education Department
Head Office
Private Bag 9114
Cape Town
8000

8 September 2009

Dear Dr Cornelissen

REQUEST PERMISSION TO CONTACT PRIMARY SCHOOLS FOR NUTRITION STUDY

I am currently a Masters in Nutrition student at the Division of Human Nutrition, Stellenbosch University.

My research study topic is '***An Evaluation of Knowledge and Current Trends of Omega-3 (n-3) supplementation in parents of children at Public primary schools in the City of Cape Town (CoCT)***.'

I would like to request permission to contact the relevant Primary Schools in the Cape Metropole area to take part in my study. The schools were randomly selected using the Random Number Generating Tool in Excel.

With your permission, the study will entail the following:

- A letter will be sent to each relevant Principal of the schools selected, requesting attendance the next Parents Teachers (PT) meeting.
- A questionnaire and pens will be distributed at the Parents Teacher's meeting, to be completed by the parent.
- The questionnaire will be voluntary/optional and anonymous. On the front page of the questionnaire it is indicated that by completing the questionnaire the parent is agreeing to partake in the study.
- Each school will also be offered the option of a short 10-minute presentation following completion of the questionnaire, as an acknowledgement and appreciation for completing the relevant questionnaire.
- The presentation will be for informational purposes – called '*The value of Omega-3 in my child's diet'.*

I trust my request will receive your favourable consideration.

I look forward to hearing from you soonest.

Yours Sincerely

Stellenbosch University http://scholar.sun.ac.za

Megan Pentz-Kluyts RD(SA)
M. NUTRITION STUDENT
megan@nutritionsa.com

Fakulteit Gesondheidswetenskappe • Faculty of Health Sciences

Verbind tot Optimale Gesondheid • Committed to Optimal Health
Division of Human Nutrition • Afdeling Menslike Voeding
Department of Interdisciplinary Health Sciences • Department Interdissiplinere Gesondheidswetenskappe
Posbus/PO Box 19063 • Tygerberg 7505 • Suid-Afrika/South Africa
Tel.: +27 21 938 9259 • Faks/Fax: +27 21 933 2991
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Stellenbosch University http://scholar.sun.ac.za

APPENDIX 9

Navrae
Enquiries
IMibuzo: Dr RS Cornelissen

Telefoon
Telephone
IFoni: (021) 467-2286

Faks
Fax
IFeksi: (021) 425-7445

Verwysing
Reference
ISalathiso: 20091016-0032

Wes-Kaap Onderwysdepartement
Western Cape Education Department
ISebe leMfundo leNtshona Koloni

Mrs Megan Kluyts
13 Warwick Road
West Beach
CAPE TOWN
7441

Dear Mrs M. Kluyts

RESEARCH PROPOSAL: AN EVALUATION OF KNOWLEDGE AND CURRENT TRENDS OF OMEGA 3 (N-3) SUPPLEMENTATION IN PARENTS OF CHILDREN AT PUBLIC PRIMARY SCHOOLS IN THE CITY OF CAPETOWN.

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. The programmes of Educators are not to be interrupted.
5. The Study is to be conducted from **19th October 2009 to 30th March 2010**.
6. Should you wish to extend the period of your survey, please contact Dr R. Cornelissen at the contact numbers above quoting the reference number.
7. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
8. Your research will be limited to the list of schools as submitted to the Western Cape Education Department.
9. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
10. The Department receives a copy of the completed report/dissertation/thesis addressed to:

    The Director: Research Services
    Western Cape Education Department
    Private Bag X9114
    CAPE TOWN
    8000

We wish you success in your research.

Kind regards.

Signed: Ronald S. Cornelissen
for: **ACTING HEAD: EDUCATION**
DATE: 19th October 2009

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APPENDIX 10

13 Warwick Road
West Beach
7441
Cell: 0824571041
Tel: 021-5541760
Fax: 021-5541760
megan@nutritionsa.com

School A
Address Details

DATE 2010

Dear

REQUEST PERMISSION FOR NUTRITION STUDY

I am currently a Masters in Nutrition student at the Department of Human Nutrition, University of Stellenbosch.

My research study topic is ***An Evaluation of Knowledge and Current Trends of Omega-3 (n-3) supplementation in parents of children at Public primary schools in the City of Cape Town (CoCT)***.'

I have obtained permission from the Western Cape Education Department (WCED) to contact you regarding the above research study (reference letter: 20091016-0032).

Schools in the Cape Metropole area were randomly selected using the Random Number Generating Tool in Excel. Your school, Starling Primary School, was chosen to partake in my study.

I hereby request your permission to execute my study at your school. The study will entail the following:

- Attendance at the next Parents Teachers meeting to be held at your school.
- At the meeting, I will briefly explain the purpose and reason for my study. This will take no longer than 5 minutes. I will then request that each family partake in the study, by completing a questionnaire.
- Questionnaires will be distributed at the Parents Teacher's meeting, to be completed by the parent. The questionnaire will take approximately 5-10 minutes to complete.
- The questionnaire will be optional and anonymous. By completing the questionnaire the parent is agreeing to partake in the study.
- Upon completion I will collect the questionnaires.

I trust my request will receive your favourable consideration.

I look forward to hearing from you soonest.

Thank you.

Yours Sincerely

Megan Pentz-Kluyts RD(SA)
M. NUTRITION STUDENT
megan@nutritionsa.com

Stellenbosch University http://scholar.sun.ac.za

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APPENDIX 11

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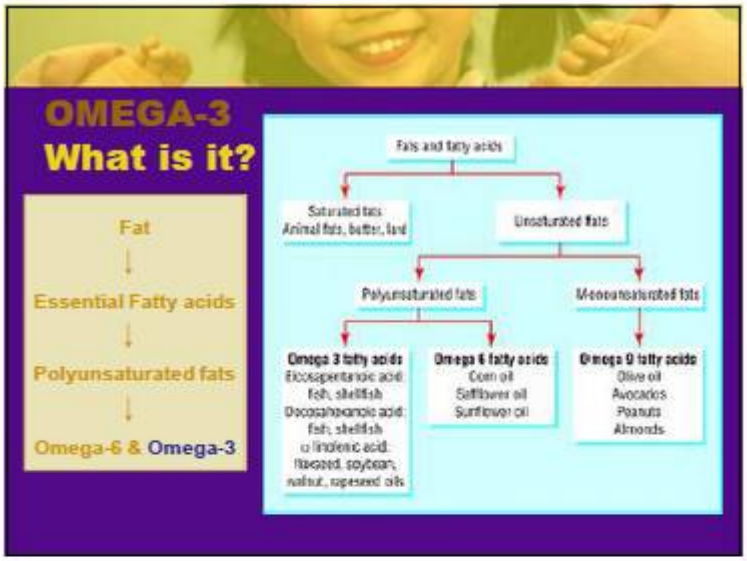

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